

Sediment Workgroup

March 16, 2010 Meeting Summary

Location

Tacoma Wastewater Treatment Plant, Tacoma, WA

Sediment Workgroup Members Present

Joanne Snarski, Lon Kissinger, Glen St. Amant, Teresa Michelsen, Pete Rude, Jack Word, Clay Patmont (phone)

Ecology Participants

Chance Asher, Martha Hankins, Brad Helland, Laura Inouye, Fu-Shin Lee, Russ McMillan Dave Sternberg, Stacie Singleton, Greg Glass, Ecology consultant.

Audience

Jessi Belstom, Port of Vancouver; Gene Revelas, Integral Consulting; Roger McGinnis, Hart Crowser; Heather Trim, People for Puget Sound; Denice Taylor, Suquamish Tribe; Rob Pastorok, Integral Consulting; Sylian J. Rodriguez Lattuada, AECOM; Jacob Letts, Paul Webber, Environmental Resolutions; Todd Thornburg, Anchor QEA; Nancy Winters, HDR Engineering;

Agenda

1. Freshwater Standards: Biological Endpoints Updates (Teresa Michelsen, Russ McMillan)
2. Human Health/Background Discussion Session (Chance Asher, All)
3. Statistics (Greg Glass)
4. Update on Roadmap – pending agenda items (Chance Asher)

Meeting notes are organized by the agenda number and include a short summary of material presented with a brief summary of the main discussion points. Detailed notes on the discussion are included in an appendix.

Acronyms

AET – Apparent Effects Threshold

AKART – All Known Available and Reasonable Technology

ASTM – American Society for Testing and Materials

BPJ – Best Professional Judgment

CERCLA – Comprehensive Environmental Recovery, Compensation and Liability Act

CSL – Cleanup Screening Level

COC – Chemical of Concern

EIM – Environmental Information Management database

ESA – Endangered Species Act

FW - Freshwater

MCL – Minimum Cleanup Level

MTCA – Model Toxics Control Act

PCB – Polychlorinated Biphenyls
PLP – Potentially Liable Party
QA – Quality Assurance
RSET – Regional Sediment Evaluation Team
SMS – Sediment Management Standards
SQS – Sediment Quality Standards
SQV – Sediment Quality Value
TEL – Threshold Effects Level
TMDL – Total Maximum Daily Load
TOC – Total Organic Carbon
USEPA – United States Environmental Protection Agency
WQ – Water Quality

Meeting Summary

1. Freshwater Standards: Biological Endpoints Updates (Teresa Michelsen, Russ McMillan)

a. Ecology Presentation

- Had been questions about the reliability of endpoints for *Hyalella* and *Chironomus* bioassays for freshwater environments. Teresa reviewed spreadsheets and presented reliability analysis.
- Reliability may be reduced by natural variability being greater in freshwater environments, or because mortality is not a good endpoint for subchronic tests, or if the minimum difference threshold is set too tightly. After discussion, decided to investigate the minimum difference threshold using existing freshwater bioassay data from EIM.
- Teresa looked at the hit/no-hit criteria for both SQS and CSL. She downloaded all the freshwater bioassay data from EIM and looked at reliability using a range of percentage differences (10-30% at 5% intervals) between the test and control samples. The RSET workgroup had set reliability goals in range of 15-25% false negatives and false positives.
- For *Chironomus*, the 10-day growth test did fine. But for the mortality endpoint, reliability gets better with greater difference between the test and control samples – meet reliability goals at about 20% difference from control.

- For *Hyalella*, the pattern is not as clear – do not see consistent increase in reliability as difference between test and control increases. Meet reliability goals around 15-20% range.
- Chance stated that technical issues have been laid out, Ecology has not yet made a decision on what % to use. Ecology has also not yet made a decision on chemical criteria.
- Russ stated that we need feedback and input within a short time frame – next 2 weeks.

b. Workgroup Discussion

- Question about if controls were natural sediments. Yes
- Question about reliability performance being affected by number of replicates. Answer – Working with historic data – not able to change number of replicates, but samples with insufficient replicates were not included.

c. Audience Comments

- Roger suggested that it might be appropriate to look at variability in biological tests in the reference samples – has seen large ranges in survival in multiple runs of the same sediment.

2. Human Health/Background Discussion Session (Chance Asher, All)

a. Ecology Presentation

- Chance reviewed background definitions in regulations and list of suggested definitions for proposed regional background from previous meetings.
- Chance reviewed the list of implementation options – remedy selections and implementation, and resolving PLP liability. Chance worked with the group to develop three example scenarios to illustrate the issues.
- Chance asked the group about the feasibility of using institutional controls to settle cleanups.

b. Workgroup Discussion

- Teresa suggested that you keep it simple, establish regional background on a watershed basis using already defined urban bays. Keep risk, background, feasibility as separate issues.
- Teresa suggested that regional background be defined by Ecology establishing how far from point sources the sample needs to be. The agency should collect the data and do the calculation.

- Lon suggested that just looking at distance from sources isn't sufficient – need a process that also looks upstream and at sources – what is coming in and can it be controlled.
- The word “uncontrollable” is vague and bound to cause problems, most sources are controllable if there is enough money.
- Pete suggested that any definition will need sub-definitions to clarify.
- Agreement from others that regional background should be defined on a watershed basis. Discussion about how to define the boundaries of that watershed.
- Clay suggested that regional background should include local atmospheric sources such as backyard burning and tailpipe emissions.
- Glen suggested that regional background concentrations must be considered dynamic and have a process to revisit them over time.
- Idea of regional background is to make cleanups more feasible and get remediation going instead of fighting in court. Some sites may not even be able to reach regional background levels.
- Teresa suggested that sites be defined based on areas above regional background – that is a definable site that can be attributed to the PLP. A separate process is needed to address these area-wide issues, and it can't just be cleanup – needs to look at sources.
- Glen suggested that Ecology treat the region as a site and name multiple PLPs, then you don't have to be so concerned about site boundary.
- Teresa suggested that the PLP clean up their defined site, the mixed area would still be a sediment impact zone, but MTCA liability would have been addressed. Then have to address remaining area through Clean Water Act to reduce sources further. You have to work on the area-wide contamination and recontamination through the Water Quality Program at Ecology.
- Discussion about need to incentivize the cleanup portion – get the hotspots cleaned up in the short term, but still make progress on the long-term goal. Will need ongoing monitoring to see if natural recovery. Will need to identify and control sources to get there.
- Acknowledge that the timing of cleanups often driven by property transfer or redevelopment - may not wait for lengthy bay-wide process.
- Lon suggested that there should be greater public education so the public realizes the limitations of cleanup and that in many cases – there will be recontamination. We can cleanup legacy contamination, but for many chemicals there are still many ongoing sources.

- Discussion about remaining area-wide contamination after the hotspots are cleaned up. If PLPs contributed, they should be on the hook for ongoing monitoring – but can't keep them on the hook indefinitely for sources they have no control over. May be impossible to determine individual contributions to area-wide contamination.
- On institutional controls, Teresa suggested there are two purposes – to protect caps and to protect habitat mitigation areas. No place other than that.
- Clay suggested that fish advisories could be an appropriate institutional control.
- Glen objected to using fish advisories as an institutional control to allow higher cleanup standards at a site. Fish advisories still are appropriate to provide risk advice to the public.

c. Audience Comments

- Roger suggested that you do not know what is coming out of the pipes in the scenarios – very few NPDES permits do any chemical testing of the effluent.
- Heather suggested more focus on adaptive management and how background changes over time. She expressed concern that the group is trying to work around the source control issue, which is status quo, instead of coming up with solutions to address this issue. This is a silo problem at Ecology where the programs are not working together. The public is not going to accept this – we need to get out of that box and start thinking of solutions that will work.

3. Statistics (Greg Glass)

a. Ecology Presentation

- Greg opened the discussion with a few comments. One issue is the representativeness of the data to describe the concept of background that is intended. Statistics is not going to save us from datasets that don't have enough data or are not representative. There are urban to rural gradients for many chemicals, and background distributions may not be the same from place to place. May make the error of making background too strict and not achievable – or could have cleanup to background plus some allowable increment.
- Chance reviewed the list of statistics discussion topics and the draft list of statistics questions to be addressed.

- Greg discussed that background is not a number – it is a distribution of numbers. There are many statistical tools, important to have a well-defined statistical question in order to choose the correct statistical tool. Many other programs have used statistics in different ways – what do you think is a good or bad model?
- Greg discussed tandem tests – using more than one statistical test such as comparison of means and comparison of upper tails between the site and background. Could have allowable increments or a percentage of allowable exceedances.
- Greg discussed tiering a statistical approach based on site complexity. Simple sites could utilize simple statistical methods. Mega sites could have an off ramp and have more specialized statistics.
- Greg further discussed the idea of increments over background, that it had a lot of policy and public information considerations, but it could simplify the statistical approach. It could get away from random fluctuations causing a failure. In many places, may not get to comparison to background because remediation levels may be much higher than background.

b. Workgroup Discussion

- Jack was concerned that the questions listed do not address bioavailability and biological responses.
- Clay thought the questions were framed well. Would like to discuss the spatial aspects further.
- Teresa thought that a more basic question is what does the data look like, which would narrow down the statistical tools. She thought should keep the issues separate of characterizing regional or natural background and setting a cleanup standard.
- Lon suggested that we look at performance – how false positives and false negatives might have economic implications.
- Teresa discussed the DMMP statistical workshop experts thought tandem tests weren't needed – answering the same question twice. It could be that tandem tests are answering two slightly different questions.
- Teresa suggested it was difficult to define small, medium, large sites. Idea was to provide a background population (e.g., Bold dataset) and a single number (e.g., 90th percentile). If you are a small site can compare to the number. Or if you have at least 10 data points, can choose to do the population to population statistical comparison or use the number.

- Jack commented on that there is some inherent inaccuracy in chemistry data – spike recovery ranges of 3 to 5 fold are common – there is a lot of noise in the data.
- Teresa said that the increment or delta issue had some regulatory problems – not consistent with guiding documents, but that could just be the DMMP.
- Clay expressed concern that BOLD dataset based on 2 cm of sediment, while site compliance is 10 cm of sediment.
- Laura clarified (later) that the BOLD dataset was 10 – 14 cm.
- Lon thought it would be interesting to look at an increment over background that had a basis in human health risk.
- Clay would like to have further discussion on the scale issues.

c. Audience Comments

- Heather expressed concern that often statistics are done without adequate data. She thought the complexity of the site should have some bearing on how many samples are needed.
- Roger wanted to emphasize Jack's comment that there is a lot of variability due to analytical methods – can get a range of concentrations even from a single sample, especially at low concentrations.

4. Update on Roadmap – pending agenda items (Chance Asher)

a. Discussion

- Ecology will not meet the original schedule of having draft rule language by April. Ecology appreciates all the valuable input from this group. Would like to schedule a couple additional meetings.
- Discussed with the group what the MTCA/SMS group has been reviewing.
- Discussed with the group the Sediments topics and whether all needed to still be on future agendas for the Sediment Workgroup.
- Asked the group to put specific ideas in writing, but to email and cc everyone.

b. Workgroup Discussion

- Teresa is willing to attend more meetings. She would like more discussion on how group discussion is synthesized into rule language. Doesn't feel like group needs to discuss "Other deleterious substances" issue. She would like to provide written suggestion by email for how to synthesize information.

- Jack and Clay agreed that more meetings would be okay. Chance will discuss with other group members individually at a later time.

Appendix: Detailed Meeting Notes

Introduction (Chance Asher)

Chance reviewed agenda.

Heard from group want more free flowing discussion and less structure. That's what we are going to do today.

1. Freshwater Standards: Biological Endpoints Updates (Teresa Michelsen, Russ McMillan)

Russ:

- First want to set context – haven't addressed freshwater stuff in detail since December, although an update was given in January. First issue we came across – where are we in process and what do we have available for adoption. If possible want to do both biological and numeric criteria. At the time, weren't sure we were far enough along in completing development of sediment quality values. We were focused on preferred alternative, which was bioassay endpoints. But now because of changes in time frame, we think we have enough progress to consider the numeric criteria. Preferred option might be changing.

We looked at this table of bioassay endpoints. Discussed some problems we might have with this group of bioassays. Question that arose -Do we have adequate reference tests for *Chironomus* and *Hyaella* – those are the ones outlined in yellow. The differences between test and control might still be within the noise of the test itself, such that we couldn't see a repeatable outcome that would give us that 10% difference. This was also a question about the reliability of the bioassays that were being used to develop the Sediment quality values – the numeric criteria. Looked at revising those – that is what Teresa has been working on last couple months.

Teresa: These slides will be sent out after meeting. PowerPoint first and then spreadsheets. The issue is that down at the no adverse affects level – which is either the SL1 or the SQS depending on whether you are dredging or cleaning up, the *Chironomus* and *Hyaella* acute mortality tests did not have good reliability. All the other tests met our reliability goals. Not having good reliability means these tests did not have good correlation with chemical concentrations. These can't accurately predict toxic effects. However both the growth and chronic endpoints were reliable at both the low and high levels. Mortality tests were also reliable at the high levels. Just having difficulty with mortality for these tests at lower level.

Next slide: there are several possible causes for this that we discussed at our interagency workgroup. The first – lot of natural variability of bioavailability in freshwater environments – more so than in marine environments. If this were the main cause we would be having problems

with our other bioassays as well. We are thinking this is probably not the most significant cause of this problem. Second, mortality is not going to be a good endpoint for looking at low levels of effects. Growth and other endpoints are going to be better for looking at subchronic or low levels of effects than are 10 day acute mortality tests. However, we all use the 10 day acute mortality tests in all of our sediment programs. This is a fairly significant policy issue. Third, it could be that we set our minimum difference threshold too tightly. With only a 10% difference, it could be that we are below the minimum detectable difference threshold. So that is the one that we have the most control over. The others are either natural variability or they are laboratory tests – issues that we can't do anything about. But we can control what our hit/ no hit criteria are. We thought that we could test the hit/no-hit criteria and possibly improve on it. So checked with labs in region, Chris Ingersoll, Dave Mount, this workgroup – all of those sources confirmed our thought that 10% may be too low.

Next Slide: We looked at hit/no-hit criteria at both SQS and CSL. Wanted to look at a broad range so we could see trends. Went from 10-30% difference from control at 5% increments. We programmed all these criteria into EIM, and downloaded all the freshwater data from EIM and compared them to these criterion. That was a pretty big job. We redid all the FPM modeling and reliability testing for each test and reliability criterion. So then if we go to the spreadsheet, I can show you the outcome of that. In order to compare the data to the endpoint – take each sample and compare to programmed EIM points and it gives you a hit or no-hit result. And that's what's used for the modeling.

Looking at the spreadsheet – Yellow –did not meet reliability goal. As a workgroup we had set reliability goals for both false positives and false negatives. In the 10-20% range – wanted to have really low values of false positives and negatives. You might say that is unrealistic – but we achieved it in 2003 when we developed freshwater goals, so we did feel they were reasonable.

In the upper left you can see 10% difference from control – that was our original proposal. You can see that it didn't meet the reliability goals at all. If you go down to 15 the light blue bars are within 5% of our goals – so we are starting to see some light. When you go down to 20% difference from controls – the dark blue bars meet our reliability criteria. And then you can see for Chironomus 25 and 30. It gets progressively and substantially better the further you get from control. This test – it's fairly clear that it is unable to detect small differences from control at those levels with significant reliability. That's something for the sediment cleanup program to consider. The Chironomus 10-day growth test did fine. If you are running Chironomus and using both endpoints – probably fine. But it did show that if we increased our difference from control – we are probably in better shape. Ecology hasn't decided which of these values to use. There are a lot of options and a lot of discussion that needs to go on. But we improved the results somewhat, though I would probably say this is still not a great test for this use.

Lon: The greater the difference that you tolerate, then the greater environmental impact that you are willing to permit then, correct?

Teresa: yes, but a 15% difference from control – while discussing this with labs – the acceptable mortality for control is likely to be tightened up within the next year or so. ASTM, Ingersoll – looking at this and surveying the labs determined that quality assurance will be tightened up. So we are proposing tightening up the control and loosening up the sample by the same amount for the same total mortality in the sample. It's just a more realistic reflection of what you need - a little more difference from the control to see an impact. You may not be making much difference environmentally.

Now look at *Hyalella* – we see a slightly different pattern. You can see it's roughly the same pattern, but isn't the same as with *Chironomus* where it gets bigger as you get further from control. A little bit further from control and then after that – basically it's the same as a 5% increase. It's not clear that there is much to be gained by going just a little bit away from the control. Not as clear of a trend. While *Chironomus* had a clear increasing trend in reliability further from the control – this just has a small increase in reliability and then it tapers off. But still at least we are starting to get some blue bars – which is what we are looking for – we've met our reliability guideline. I would say we were moderately successful. If you look at our reliability numbers – starting to see things in the 70 to 75% range for *Hyalella*, and for *Chironomus* we were a little bit higher 70 to 85% range, which is pretty good for any SQG. I think we are starting to see us getting into the range we want to be.

That's all I have right now. Will send this out – feel free to comment. Ecology and Oregon DEQ will continue to have discussions on which % difference from control to use. And you can see that there are options within each difference from controls. There are a couple different dimensions on which we are making this decision. When that's done, I'll be writing a report and this will be going out for public review, as each agency incorporates this as part of the rule revision process.

Audience question: These controls are natural sediments?

Yes

So they are pretty close to what you would see for reference sediments as well?

Yes, it depends on the lab and what they are using for control, but most of them are using natural sediments. May not be in other parts of country, but around here most labs do.

Brad: Because the false positive and false negative rates are related to the number of replicates, is it worth investigating changing the number of replicates to see if it can change performance?

Teresa: Don't have the luxury of doing that for historic data, which is what the SQGs will be based on. The number of replicates is set by ASTM protocols which are based on round robin studies and power analysis. It's pretty well established. I think it's basically you can't take an acute mortality test and expect it to do a chronic job. There's just inherent limitations to the biology of these tests and we've been kind of ignoring that in the past. The workgroup has raised it as an issue and are

discussing with Ecology, DEQ and the Corps. People shouldn't rely on an acute mortality test alone to make decisions about chronic toxicity.

Jack: It's interesting that the difference in control is really close to that of other tests such as the amphipod. I think it was 18.

?: Is there a similar situation with marine tests?

Teresa: Our original proposals were actually based on compatibility with the marine systems. But the marine systems are more consistent. Not sure that was a realistic goal. Need to allow for more natural variability in the freshwater environment. So that may have been a tad misguided. Plus we were originally looking at a difference from reference and now we are looking at a difference from control, which may need a little extra space for comparison.

Russ: We will be looking for a short turnaround on comments and questions.

Teresa: The next two weeks we are going to be trying to make a decision on this issue, which endpoint to use within the next couple weeks so I can write the report by the end of the month. Assuming of course that there are always interagency discussions that take as long as they take. But that's our goal. If you have a comment on which endpoints to use, or if you have questions about the tables and reliability parameters mean – I'd be happy to explain. If you have comments, get them to me the sooner the better.

Chance: About the freshwater, we have a couple questions that need to be answered. The technical issues have been laid out but the agency hasn't made a decision whether or not these numbers/body of work are ready for promulgation. And the other decision the agency hasn't made is whether these numbers are the best numbers for us to use, or if there are other numbers. We still have some internal deliberation that is happening. We aren't necessarily looking for consensus either internally or externally, but need to make sure we have that process worked out. Those are two important decisions that need to be made. It would be good to get feedback from folks. Once we get this work finished and the report is written up, would like to bring that back to this group as a package. This group will have an opportunity to weigh in. The goal at this point is to promulgate biological criteria and endpoints, and promulgating chemical criteria if we can. If we can't, then we can look at the potential of using these updated values for guidance.

Teresa: This work applies to both. It applies to the biological criteria directly and it affects the chemical criteria. We need to get this sorted out to make decisions on both chemical and biological criteria.

Chance: Exactly.

Clay: Are there plans to re-evaluate the reference sediment study results?

Teresa: Not today. Dave and I talked about doing that. They have the data from their reference areas and when they tried to evaluate it using these original criteria, they got some weird results – hits in those lakes. One thing we could do now that we have those results is to go back and re-evaluate that report and see if these alternative endpoints clear up some of that data. But we haven't done that yet. I just finished up this work.

Clay: So this work only affects the two acute mortality tests?

Teresa: Those were the two values we were recalculating.

2. Human Health/Background Discussion Session (Chance Asher, All)

Chance: Next going to go through definitions for Regional Background. Take a look at the handout that is titled "background summary", and the other one titled "sediment background discussion". Go to last page of sediment background discussion that says "sediment regional background". The background summary document look at first page – has definitions we want to talk about. We also have them up here on the wall. Want to let this be more of a free flowing discussion. What is up here in italics is original definition – just a starting point – can be revised. We want to discuss for next 20 minutes the feedback we've gotten from this group and the MTCA/SMS Advisory Group on how to revise this regional background definition. These are all just concepts: habitat stratified, tie to a conceptual site model considering sources, resuspension and relative contribution of those, watershed approach – was brought up quite a bit of folks. Not sure what that would mean – the formal definition of watershed in Washington or it could be if you have a source, or combination of sources that couldn't be attributed to the PLPs – might have to step outside of a watershed, or have multiple watersheds. And then perhaps could determine regional background for each watershed – that would be a big job, but could be an approach. Another idea is to establish regional background based on recontamination. I don't know what that would look like. Then there is the local conditions idea – background that is coming from permitted dischargers. Then background based on whether AKART is applied and facilities are in compliance what is actually attainable after facilities have attained AKART. That might be tough because there are a number of facilities that haven't attained AKART. And then the idea of sampling sites located away from point sources. That's pretty obvious, but I think answering what is a point source is pretty difficult. This idea of regional background on a payoff point – based on what you could actually get done. Another – base background on what you could actually remediate from a technical feasibility standpoint – what you could cap, what you could dredge. Or base it on a level once you've realized you can't identify all the discharges or there are too many dischargers to name as PLP. It would be inconsistent with where you are at, but it's an idea. That's on the handout too if you want to make notes. It would be good to walk through these ideas or if you have any more thoughts. We would like to get your thinking and then maybe use this information for the discussion we have this afternoon on statistics. Or we could go through these ideas and determine which of these ideas are really feasible.

Teresa: Having been involved in DMMP in having to develop dioxin background. Keep this simple, don't make it too complicated or you will never get through it. I would like to see this done on a watershed basis, and I think we already have them defined. The urban bays have been a central part of the program for a long time and their boundaries are defined. Use the urban bays, don't re-invent the wheel. Have them figure out the regional background and use it for all sites. Don't do it on a site by site basis or you will spend months to years determining what regional background is and it will be inconsistent from site to site. Some of the things up there don't have much to do with background – AKART, what is feasible to remediate – that should come after background. What is the background. What is the risk. Is the risk below background. Then what is feasible.

Those are three separate questions to me – risk, background, feasibility. Don't want to get them too mixed up.

Brad: If we do watershed based regional background, how then do you remove from consideration known and controllable point sources.

Teresa: With the dioxin work, we set up some rules about how far you need to be from a point source or from a site to be included. And we found that some areas in urban bays could be considered for natural background, not even regional background, I think it is doable. The urban bays aren't as contaminated as they used to be. I think it could be done. It's a matter of the agencies getting together and saying about how far from a point source is okay, and then calculating some numbers. If it doesn't get too political and it isn't done site-by-site, I don't think it will be that bad. That's just my personal view. Maybe Laura thinks differently.

Laura: Lot easier to get away from point sources when you are in the open ocean and in Puget Sound – but how do you deal with that in freshwater. We have been struggling with finding examples in freshwater – you can't go a ¼ mile offshore in a river. So you end up going way up river or down river and it's extremely difficult in freshwater. Easy in Puget Sound, but extremely difficult in freshwater.

Chance: Ask question about watershed. Teresa is saying the idea of urban bay for a watershed approach. Laura is saying the idea of a watershed approach is difficult for freshwater. So maybe if you go up feeder streams – literally the watershed – would that work?

Teresa: Probably not.

Lon: I think you're right, you start out with a regional background – but you have two other considerations. You have what is coming in from feeder streams. If you look at the Duwamish for example, the Green River isn't much help – it's relatively clean compared to the Duwamish. And I think you do have to look at sources. It's maybe a tiered process or a sequential process. What is a regional background number, how does that look compared to a particular location. Once you look at that particular location, what's coming into the system – what do you have to work with. And then what are the sources coming into the system, and can they be controlled. Again I know source control is coming up over and over again – but I think it is really critical. It determines what you can and cannot do and it's difficult – it's a source by source continuous process.

Teresa: The one word that has been really been bothering me in your definition up there is *uncontrollable*. That's a really vague term and if you use it, it's bound to cause problems. All of these CSOs and storm drains are eventually controllable but they are on decades to hundreds of years time frames, and that's not helpful when you are trying to get a site cleanup done. I think there needs to be some discussion of that word "uncontrollable". Stuff can be controlled in a long term or with immense amounts of money, but there is a level of sources coming in, even air deposition and other sources coming in that aren't going to be controlled in a reasonable time frame relative to the site.

Chance: Do you have a suggestion?

Teresa: I don't, but I feel very uncomfortable with that word. We do have to look at sources and decide which ones need attention. If there are facilities that haven't done AKART, then we may need to

look at those NPDES permits. But if there facilities that have long term plans for control programs – even if they are decades out, then we just have to accept that as part of our regional background and ultimately ratchet that down.

Pete: When I was working on the assignment, I looked at definitions like this and thinking about how to refine this – it seems like anything we do we need to add sub-definitions. Like what is the definition of uncontrollable, what is the definition of mechanism of contribution in this context - whatever is created is just a cascade of additional definitions. Following up on what Teresa said, the idea of having regional background set for various bays – that would be it – or would there be the opportunity for someone going through their own process if they wanted to do it.

Teresa: I wouldn't do it if I were a regulator. The agencies maybe collectively in a public process have gone through it – what's a conceptual site model for that bay, what are the sources for that bay. I don't think it makes sense. This is what ties up our projects for decades – people coming in with arrays of contractors and trying to demonstrate something different. That would be counterproductive.

Glen: I agree that regional background should be set on a regional basis – on a watershed basis, but I want to think through that a little bit with some specifics. The conceptual site model for Lower Duwamish is that 99% of the sediment comes from upstream sources, only 1% from lateral loads. The Duwamish deposits into Elliott bay, as a watershed, would you be setting the Elliott bay background to Green River?

Teresa: I would separate Elliott Bay from the Green River, and also say – if your site is a whole river – like the Portland harbor, then maybe you could have that developed as part of the RI/FS.

Glen: There certainly is some – for a group that utilizes the whole system to have some consistency with the cleanup targets. But from the regulatory side of things, I see it potentially becoming more complicated. From either the human health or ecological side, it makes sense to take a watershed approach. But when you follow it out into the bay – things get a little more complicated.

Teresa: because there are different sources to the bay.

Chance: When we are talking watershed, and a bay – are these separate. These are ideas that we need to think through. Where do you stop with an embayment, and where do you go upstream. You would do that for freshwater...maybe.

For Puget Sound, would we use the watershed as it goes to the embayment and out the embayment, or do you use Puget Sound. For freshwater you could use the river and the feeder streams, it seems more clearly defined. For Puget Sound, I don't know where that watershed ends. I'd like to discuss that.

Jack: I like the question you are starting with. Essentially when you get to trying to define a contaminant level that is acceptable or matches regional, you need to understand how that contaminant got there. If you take the example of a total organic carbon normalized value like DDT or dioxin, the concentration in a nearshore environment, or the concentration in an offshore environment – where you have more fine grained sediments the concentration is going to be much different. The controlling factor is the organic carbon equilibrium partitioning availability of that

contaminant and that is what would go from the watershed all the way down into the bay. If you had a TOC normalized value for that, you would see a much more closely monitorable type of evaluation. It's going to be the thing that controls the toxicity, bioavailability, it's not just what's in the sediment. What is in a coarse environment is very different than what is in deeper environment, but they are coming in there in the same way – that is being carried by TOC. So when we start talking about the distribution, persistence, mechanisms of contribution occur – that is what we need to get to, not the magic number in sediment to get to and if its' too high or too low. It's going to change depending on where you are. I'm adding complexity – I think we need to. Otherwise we end up with numbers that we don't know what to do with.

Clay: I have 3 points. First is this issue of how you define the watershed. I really like the hydrodynamically defined concept – going to Glen's example of Elliott Bay versus the Duwamish. Depending on where you are – the east waterway or the west waterway – it does look like there is a subtle component of transport into the east waterway from Elliot Bay. There may be more contribution from up river or down river depending on very site-specific sediment transport conditions. The second point is I don't think this discussion helped by always focusing on the Duwamish. The Duwamish is one type of site that could be addressed down the road by MTCA or SMS, but there are so many other kinds of sites that are very different. Example that Lon raised, most of our conceptual site model, that most of the sediment load is coming from upstream. The contaminant load is coming from very localized sources – is really different from a lot of other sites. It's important to think about how these things could play out in the Duwamish, and how they could play out in Port Angeles or Everett Harbor – something that is not quite as complicated. Third point is that I would really hope that the regional background definition that we would come up with would acknowledge that atmospheric sources, whether from backyard burning or industrial sources or car emissions. I would like to find a way to make the atmospheric deposition and resultant runoff into a site part of the definition of the watershed and the part of definition of regional background. To me this is going to be fundamental to the success of this type of effort. One of the concerns I had about the regional background approach that was laid out for the central waterfront, I think there are a lot of good things in there, in that kind of concept, but to exclude atmospheric sources almost guarantees you will have a lot of unnecessary complications.

Chance: With the atmospheric sources, how would that be definition be different than the definition we currently have for natural background with the globally distributed sources? How would you distinguish that?

Clay: I think there are a lot more local atmospheric deposition sources than there are at a global scale. There are PCB and dioxin components in the global rainfall distribution, but both of those are much much higher locally. Best example are some of the PAH deposition – they are more concentrated in urban areas. By using the word global, it leaves out a very important component of sources – the day to day activities in an urban environment. That's very different.

Chance: Look at document that says sediment background discussion – look at a table on first page. Columns for non-anthropogenic background, natural background, regional background, area background. We have on there types of sources – if you look – there is one type of source that has

locally deposited aerial deposition sources – and it is blacked out for regional and area background – that means that type of source may be included in the definition. So that satisfy with what you are saying.

Clay: Yes I would agree with that. I wasn't sure what was trying to be conveyed with that – but the way you have it blacked out - that does it.

Teresa: The only difficulty with that – if you look at the table on the last page of the other handout. There is a table showing the different kinds of background that shows there definition. There is a table that says away from point sources for regional background. The problem is that what Clay is talking about is the potential for a lot of the sources – not just falling directly on to sediments – but the potential for it to fall on land and then running off as stormwater. So if we exclude stormwater outfalls as point sources we have a contradiction. And my first thought is that the stormwater outfall is a point source and I need to exclude it – but maybe we need to look at excluding the area next to the point source where it is unusually concentrated.

Chance: Like the shoreline?

Teresa: I don't think you can do it that simply. That's why the agency needs to do it bay by bay and determine what is going on in that bay.

Laura: And again that doesn't work for freshwater.

Teresa: Okay so, lake by lake or river by river – whatever you want to say. You would want to include the more diffuse effect of the stormwater outfalls without getting the really concentrated spot right next to the outfall. It's going to take some work, but we have adequate characterization of most of these areas at least in Puget Sound. Some of the areas may take more work, but they may have fewer outfalls in them. The freshwater lakes aren't with the exception of Lake Washington. But some of them are well studied, we could look for break points in them too, what's in the immediate vicinity and concentrated and the more diffuse areas.

Lon: I want to ensure that you don't include contaminated hotspots in the determination of regional background.

Teresa: Statistical analysis maybe?

Chance: That might be part of the discussion that we want to have in the statistical piece.

Laura: There are a lot of outlier analysis approach. We might want to go to an outlier analyses – we might be uncomfortable sampling an outfall in an area – but go ahead and sample the area and then do an outlier analysis to determine whether to remove those.

Teresa: A robust outlier analysis. There are better ones and worse ones.

Lon: Maybe I'm beginning to see more of a process. Start with regional background, then you look at what is entering the system, and then you look at source control. So maybe we define a few urban bays and this is generally the approach. Getting back to outliers and the dioxin analysis in the Duwamish. I know they looked at dioxin in sediments immediately outside of outfalls draining watersheds that were similar to the Duwamish, and there were a few outliers that were pretty clear. So maybe it's not as daunting it just has to be defined.

Glen: I guess maybe there is one additional question – the concept of a regional background value should be dynamic over time. And I don't know how realistic it is the ability to update those values

or identify a more dynamic aspect. Respect that regional background can be more dynamic and change – maybe over decades – but recognize that in the program and make sure that it can be revisited. That's not really a concrete suggestion as much as an observation. Tying back to what we have all acknowledged as the importance of source control, and AKART issues. The target could move over time.

Chance: Are you saying, about it being dynamic, about a value that it is being based on - whether it's going to go down, or whether it's going to go up. Because you have to accept one or the other too.

Glen: Yes, I understand.

Chance: Are any of these concepts on the screen just not really feasible? I think that Teresa had said that the AKART one and the payoff point one shouldn't be part of the definition. You've got risk, and then feasibility. Any of these that don't work or don't make much sense?

?: I have something else. What Glen just said made me think about – is there a threshold – if you define background and there is a risk associated with those background levels over time, you might learn more that there is more risk than we thought. More chemicals that might be there etc. Is there a threshold that bookends this? A cap in the existing regulations right now? Would there ever be or is it just what it is?

Chance: That's a good question. Right now the only structure we have to go by is MTCA. There's not a cap on the background concentration. There's a cap on risk level of 10^{-6} or 10^{-5} for multiple carcinogens. MTCA does not have a cap for risk on natural background, and it could be much higher risk than 10^{-6} , but MTCA has the default of whichever value is higher. The way we were proposing regional background would be the upper cap, and natural background and risk levels are the goal that you are trying to drive your cleanup to – but there isn't any risk cap associated with regional background.

Jack: When you brought that up, you have an established risk goal 10^{-6} , in order to relate this back to the regional background. Is that an incremental risk above what the regional background is? Or is that a fixed risk? Right now my understanding is that the dioxin concentration in Puget Sound is beyond the risk. So spending all our time trying to get to a regional background definition doesn't really get to the risk thing, unless it is an incremental risk above regional.

Chance: I think I understand what you are saying, but you need to understand that the way MTCA is set up and the regional background proposed approach – the risk could change and you have a risk level that's not going to change under MTCA and then the cleanup standard is going to be the highest of natural background, risk or PQL value. Is that what you mean by the incremental risk value?

Jack: It's a little different than that. Say you have 10^{-4} risk in Puget Sound deep water for dioxin. What do you do with regional background when your existing risk is already greater than what your stated goals are? Is it incremental risk beyond that such that you don't have an additional 10^{-4} risk beyond that – you are going to cleanup all Puget Sound which won't happen in a million years. I'm trying to get at what will the regional background really help us do?

Chance: Anybody else want to answer that?

Laura: I'll try. There are a lot of concentrations out there that are hanging out at that mid-level. What we are trying to do is get the cleanups for the spots that are high done. Because they are stalling out because right now it is going to if you detect it, you have to clean it up. Then they go to fight it in court rather than cleanup to those nondetect levels – which are very difficult and expensive to achieve. So by going to a regional background, we are trying to clean it up as best we can without controlling air deposition, without controlling global distribution and these really ubiquitous contaminants that are difficult to control from local-type contributions. What you buy by having this upper limit on this – a two tier approach with natural background as the goal and regional background as the upper tier, is to get more cleanups started and moving and getting the really high risk places cleaned up. As you do that – those can be seen as sources – they are moving around, they are bioavailable to fish as they are now. You keep leaving it in the system because you can't achieve the low values – the cleanups don't move, they don't get done and present an even worse risk.

Jack: I like that kind of definition. It has very little to do with this right now. You can go to your maximum risk environments and then work your way down to the less contaminated. It's about which drives which. What you are talking about is driving the cleanup on the backs of risk.

Chance: No I wouldn't say that.

Clay: I think the point that Jack is raising is a really important one. I liked your explanation Laura. I'm struggling to see how some of these hotspot sites could even achieve regional background. I think one clarifying question for Chance – you are looking at a range where the low end of the range is defined by natural background and the high end of the range is defined by regional background – this SQS CSL sort of analogy with a range of concentrations. For a number of sites, even considering this local aerial deposition, achieving regional background even within our lifetimes – maybe it can occur over decades is going to be a very very difficult proposition. This opens up other questions about other areas of flexibility in the rule. I want to be sure that we aren't getting overly comfortable with a regional background definition that is going to be nearly impossible to achieve.

Chance: Right – Clay is concerned that at some of these hotspot sites, regional background may be difficult or impossible to achieve. I'm assuming either from a technical standpoint or a cost standpoint?

Clay: From a technical standpoint, not even including cost.

Chance: How can we add to this definition to help with this problem?

Brad: I'd like some clarification of why, if you get a good definition of regional background, why will that not be attainable. The technical reason.

Chance: Clay, what is the technical reason that you think regional background could not be achieved?

Clay: When we start going through a few permutations of point sources versus atmospheric deposition. Those kinds of things. I think it's going to be different in different settings – I can see a situation where there might be ongoing sources – questionable whether it is atmospheric deposition or whether they may be an upstream source that is affecting things. The definition of regional

background such that – without control of that source, which may be very difficult to control, may never achieve that regional background definition. That's my conceptual model definition.

Chance: Are you saying not being able to achieve it or recontamination is going to occur.

Clay: Let's say that the regional background concentration is set at a level lower than the combined contributions of atmospheric discharges and a couple of ill-defined point sources upstream. You've got this mixture of sources that includes atmospheric and some of the global sources, but does not include the point sources that are difficult to control. If you are a PLP you are being asked to enter into a cleanup to achieve regional background, knowing that there is another component of the regional source contribution that there is not really a plan with how to deal with it yet. I would set the lower end of the acceptable scale at regional background – I think it is going to be tough just to get to that point. In certain situations, based on site specific conditions, set a cleanup level at the level higher than the regional background. This is really similar to what EPA does in CERCLA just to move these sites along and get cleanup done. It's a real world situation.

Chance: Okay. Going to let others comment.

Glen: I'm uncomfortable – I understand what Clay is saying – but you are starting to make a lot of exceptions for what you are saying should be a regionally achievable goal. I'm sympathetic - we talked about that there are other areas in the rule where if Ecology has said to a PRP in a regional setting – you are responsible for X area based on a definition of regional background. And through monitoring, let's take a simple concept – let's say along the fringes of that area there's been some concentrations that are above your definition of regional background. If there's been demonstration of the PRP's control of sources, then that's not something that Ecology goes after that PRP for. That's a separate issue than setting regional background as the lowest level you would achieve just because you are nervous about all of these uncertainties.

Teresa: One example that came to my mind with Clay's issue is something like Teck Cominco or Lake Roosevelt where the site is so big – no one would argue that Teck Cominco didn't contaminate the entire stretch of the Columbia River, or that Lake Roosevelt hasn't been impacted by particular PLPs – but those are not examples of regional background. We could develop regional background for those areas – but the chances that you are going to meet them in a cleanup throughout the entire stretch of river – or all of Lake Roosevelt, or all of Portland harbor – the chances of meeting it are very low. These sites are so big and involve an entire lake, river or watershed – that's one where you technically couldn't achieve regional background – or the cost would be so high. That's one point. But going back to the rule structure and the flexibility in the rule. I really want us to think about MTCA versus SMS – and what SMS was designed to do and how it was designed to do it. I would like us to think about – like Glen said – what we define as a site and use the right tools for the right things. If we could define regional background – and say anything above that becomes a MTCA site, and only those areas that are above regional background that can be attributed by that PRP. And MTCA doesn't try to get below regional background. I agree with Clay about having regional background being the lower end – or you are going to have some site managers try to push it to natural background which is just impossible. And then the upper end considering technical feasibility. If you could get the cleanup program to work on those contaminated sites

and get them down to regional background and then keep a separate list of all the areas that are above your risk targets – above your natural background – and that goes to water quality for source control, where we all know it belongs. And start working on those areas from a large scale source control perspective.

Chance: Great comments – let's save that discussion for the implementation piece. I have an idea I want to throw out first.

Lon: How difficult it will be to reach regional background depends on how you define your compliance test. So I anxiously await the statistics discussion. Just looking at the range of contaminants we have – some like phthalates are difficult – they are ubiquitous, they are still in use and entering our waterways – versus some like PCBs or chlorinated pesticides which really aren't all that much in use anymore. So the question becomes do you delay cleanup of these legacy contaminants because you have problems with the ubiquitous ongoing chemicals that are still in use. That is something that Ecology needs to think about as well.

Chance: I think that we've beat the regional background definition enough for now. I'd like to move to the implementation piece. First slide – human health background discussion. Remind you where we are at and what the goal is here. We will continue to explore the regional background definition like we are now and then continue to explore the Option 1 MTCA approach – and then to add in the cost and feasibility when doing your alternatives analysis. It can be done now – considering cost and technical feasibility, and net environmental benefit when setting a cleanup standard. But if you already defaulted to background concentration, is there flexibility in the current SMS rule, or do we need to add some. Then the third bullet – this is a big issue – need to figure out how to set cleanup standards that are actually achievable from a technical standpoint and still move towards having a conservative goal for a cleanup standard. Perhaps get the hotspots – think about that concept first – reduce risk first. Goals would be to have a lower standard but may not be able to meet that initially. The big one we've heard again – resolving PLP liability – that needs to be done – we need to figure that out – and then just having all sediment cleanups interim actions – I don't think that's going to fly with anybody – need to figure out that one. Then the final cleanup – recontamination is not directly from the PLP but rather from the “uncontrollable” sources – or stormwater not from the PLP – what do we do? Do we have some options in the SMS or MTCA that allow us to settle for the cleanup even if it is going to get recontaminated but it's not from the PLP? So we had some of these discussions internally and with our AG office. And they thought it was good for us to explore. So I thought that we could spend the next 10-15 minutes discussing some cleanup scenarios as they relate to the implementation piece, and then we can bring these scenarios back and have internal discussion with our AG office and see whether there is some cleanup flexibility in the rule as well – and to deal with the area wide contamination. This is a two-fer in terms of the cleanup scenarios as examples to help this discussion, and to help us when we go back and have our internal discussions. Make sense?

I'll start it out on the easel. These are the questions to set up for you guys and have some cleanup scenarios so we can talk about some real sites. Are there areas in the SMS and MTCA currently that can be used to make cleanups feasible and final? Again we are talking about cleanups based on

low cleanup standards – natural background or regional background – very very low standards. And then number 2. After we use these tools that are listed here and we all worked through in January – whether we have regional or natural background as your cleanup standard – these are the tools that we currently have – but they may not be teased out well enough in the rule – or we may need more. Some of these tools are in MTCA, some are in SMS. Again the goal is a final cleanup. This is the structure of the implementation that is going to go from now until 1 PM, with a lunch break. Does that sound good?

Clay: What scenarios?

Chance: I'm going to write them up on the easel and then I'll have to walk you through them.

Next slide – this is what we have been focusing on a lot – setting cleanup standards based on natural background, regional background – and now we really need to figure out how to implement that standard and how to resolve PLP liability and get cleanups done and not stall everything out. Under remedy implementation – these are all tools that we all talked about a bit – the question is how good are they – for example the institutional controls tool – are there some institutional controls used at sites, or that could be used at sites, or ones we haven't thought about using. I sent you folks an example of ones that were used for Thea Foss – the institutional controls plan. I don't know how helpful it was – I read through it and I don't know if it's going to help. But at least you have it. And then the next one is how to resolve PLP liability – these can be mushed together but here we have them kind of separated out. You can use points of compliance, interim actions – that's a tool – not one that's preferred, but it is a tool. Sediment Recovery zones – we talked about that – we haven't officially done it – they have been done, but they haven't been called that. It may be a very powerful tool. The recovery time frame one might be a powerful tool as well. And then partial settlements – that's an idea. So – this is the structure of the conversation. I'm just going to keep this up. I'll start on the cleanup scenarios and then I'll tape them up on the wall. I'll keep this simple. I'm here on a bay – doesn't matter what Bay – let's say we have 3 cleanup sites and we are doing a cleanup for dioxin. And these 3 sites – semicircles along the shoreline have high levels of dioxin – say 150 parts per trillion – the other one is 200, the other one is 250. And then you've got a lot of stormwater pipes – some are permitted, some aren't. Let's say the ones with the X have permits, and the others don't. You folks that know the water quality program know that not all of them are permitted that should be permitted because they don't have the ability from a workload and staff standpoint to do so. And again this is just an example – for dioxin in Puget Sound based on the Bold plus data – 4 parts per trillion. Let's say area background in this area is – (discussion about what number...) – let's say 20. And let's say regional background – and these little lines are geographic lines – regional background is say 10. So this is cleanup scenario 1 and we have a bunch of unpermitted stormwater discharges. And now we can do a freshwater example – let's do one.

So the 200 – the line you drew – that's the 200 contour?

Chance: Let's say the hotspot part of this cleanup is 200 and then it goes out to 20. I'm not being real clear right now on site definition – because that was one of our tools that I want us to try and work through. How do we define where the boundaries of this site are. Now showing you a freshwater

– (Spokane River) – okay let's do the Spokane River. What are the contaminants in the Spokane River – PCBs –

Clay: Has a point source contribution from the state of Idaho

Chance: What is that point source contribution number?

Clay: (static on the phone line)

Chance: Let's just say it's 50.

???: So this is the solids contribution coming downstream from Coeur d'Alene – we aren't talking relative amounts of load here.

Chance: Let's not get that difficult. Let's do three cleanup hotspots. Let's say that this river stretch is like 20 miles. Let's say our PCB concentrations – the hotspot areas for our cleanup site – What do you say they are (1000) 1000. (another at 100) So let's say I have them going from upstream to downstream 1000, 100, and 50. So we have a contribution from Idaho at 50. And then we have some stormwater sources coming in from everywhere, and let's say we have some industrial sources of stormwater, and we have residential or city stormwater.

Clay: Add a municipal source

Chance: Municipal, you mean like a wastewater treatment plant? We have stormwater, we have wastewater treatment plant, we have contribution from Idaho for PCBs, I'm going to say these concentrations are hovering around 20-30 – concentrations from stormwater above cleanup levels. Let's say the WWTP is in compliance and is discharging 30- I don't know just throwing numbers out. And then – trying to make this more complicated.... (groundwater). What's our concentration from groundwater? (6) Is that enough? (Industry) Okay can add industrial wastewater too – what are they discharging – say 50.

Dave: Could always put a dam on it.

Chance: Okay put a dam on it.

Jack: And then change the flow on it.

Chance: Let's do another simpler cleanup than the one we first did with an embayment – here it is one cleanup site – two PLPs – let's say it's dioxin again. (Pick a metal) a metal (arsenic). What's your cleanup concentration – (30 ppm) -30

Jack: And then figure that the concentrations are higher offshore.

Chance: This is getting really complicated. Let's talk about natural background, regional background and area background for arsenic. For natural background – let's say it's – based on BOLD data – let's say it's 11.

Teresa: I think your area background is way too far out in your examples. From what we are seeing in the urban bay data, regional background kind of comes pretty far in. Area background is geographically too far out. Area background should just be other sources that are right nearby.

Chance: Let's say that this is 100.

Teresa: And some of the areas that are that simple shouldn't have an area background at all – or a regional background – it should just be a site plunked in the natural background of Puget Sound – like a marina on one of the islands. Quite a few sites like that where the surrounding area is

natural background. So however we structure the rule – we need to take care to evaluate the possibility that some areas may not need a regional background, may not have an area background.

Joann: Let's just say that we have a natural background based on the BOLD data just so we have a number to go by.

Chance: If our concentrations here are 30, are you saying you are not wanting to use a regional background.

Teresa: For example, when we looked at Commencement Bay for the dioxin data – we found that Commencement Bay values are equivalent to natural background if you are out in the bay – not in the waterways.

Chance: So you mean 11. (Could be)

Jack: I was actually trying to set up something different here.

Teresa: Yes you were. I've actually never seen what you are suggesting though.

Jack: I have. In Puget Sound East passage – you end up with a value nearshore that is relatively high – but a value offshore that is much higher.

Chance: so you have 30 here what do you have for area background.

Jack: You have 30 there that is a source and it needs to be dealt with, but you have the area wide background much higher values offshore because it's tied up with fine grained material.

Chance: So 50?

Teresa: Make that regional background – you don't have an area background here because there aren't other sources.

(Are there no drains?)

Jack: Let's call it a pesticide plant that produces arsenical pesticides.

Chance: Let's say for these PLPs we have a source.

Teresa: Let's just cross off area background – that is a MTCA concept.

Laura: Regional background, area background, natural background in this example are the same. Is that what you are saying?

Teresa: Yes. I think we should avoid area background at all in sediment management standards.

Chance: Do we need another scenario?

Teresa: I don't think we need another one.

Chance: I think this helps.

Brad: Could you talk a little about where it is you are trying to go?

Chance: I want to try to use these cleanup scenarios to try to answer some of the implementation questions. How can we use some of the tools that we have currently here to actually address some of these scenarios. I'm thinking we have some more scenarios that are a little more complicated.

Teresa, is there any other scenarios you want to draw? (no) Anybody else want to draw a scenario? (no) Maybe we should stop for lunch – so think about some more scenarios because we really want to work through how to use these tools or other tools that you might identify to get these cleanups done. If we have to use natural background as a cleanup standard or regional background as a cleanup standard. The reason I tossed in area background is – there is always the option of having it as interim action. You can think about this and then draw some more scenarios.

Lunch break 11:44-12:00

Chance: I know this is an unusual concept you might be having a hard time understanding why we are doing it – we’ve been talking about these ideas of natural and regional background rather abstractly. We’ve been talking about sites, but not everybody knows what site we are talking about. The reason for setting this up is to show what we are talking about and how complicated and difficult this is. The reality on the ground of meeting certain cleanup standards when you have so many sources and you have recontamination issues. That’s why I wanted to see if we could do this. Can everybody see that paper? So let’s talk about some of these tools that we’ve got. To get folks started on this idea – MTCA has tools that the SMS doesn’t have and vice versa for getting cleanups done. The goal is perhaps to use both of them for getting cleanups done. Let’s use a more complicated site. Teresa added in when your site is commingled – can’t distinguish them from each other – and we are making them extremely simple. You will likely have more than one contaminant – but to get the concept down – we are going to use one contaminant. So what I wanted to do was walk through – if I had a cleanup standard of natural background, or regional background. What are some of the tools we could use to get to final cleanup. I think there is a very real issue of technical feasibility when you are talking about low cleanup standards. Clay had a good point. His idea of technical feasibility might be different than someone else’s idea of technical feasibility. You’ve got these sites – area background is 20 – you have all of these sources coming in. Let’s just say for the sake of argument that the sources coming in are separate than the source in water. Let’s say all of these PLPs have done their job and stopped all sources from their upland site. And they’re not discharging or contributing anymore contamination to these sediments – it’s all other sources – it’s stormwater, atmospheric deposition, whatever we want to call it. That’s best case scenario – that’s not always the case. Sometimes you can have a PLP that is still a source, but there’s such low concentrations – we aren’t even going to go there. So let’s say how are we going to resolve their liability if we know that it’s going to get recontaminated by these other sources coming in above regional or natural background, maybe even above area background. Unpermitted sources and permitted sources. I’m just throwing numbers out.

Brad: Question on the definition of area background. I thought the definition of area background would include those sources.

Chance: It would include localized sources.

Brad: So there wouldn’t be any contribution above area background, by definition. From who? From anybody different than PLPs. The only contributions to the site can be from the PLPs, or area background or local sources or regional sources. So if you have individual pipes with high concentrations coming out – that is area background. If it’s anything but stormwater – that’s area background – I guess if it is stormwater – that falls into the regional background definition. So how could a contribution from any given pipe be higher than area background.

Chance: We’ve established area background for sediments – what’s in the sediments – not based on what’s coming in.

Brad: So how do you establish an area background for sediments by other than what’s coming in.

Chance: I think those are good questions, but I think it's off subject. Let's just focus on these numbers for now. Question is how to get final cleanup using natural background for a cleanup standard – our risk levels – have to be protective of those concentrations in sediment or below. So we are using natural background. So we are using the one scenario that has the one embayment, dioxin, couple of sites – 150, 400, etc. Talking about stormwater sources – some permitted, some not permitted contributing between 4 and 30 – each contributing different values. Brad brought up an interesting question but I don't think we have time to discuss that right now. Right now we are trying to work through if we had natural background as our cleanup standard because our risk level at 10⁻⁶ is below natural background. How do we resolve PLP liability? Under these scenarios, how do we define the site? How do we incorporate costs and feasibility when we do the alternatives analysis? Can we have a recovery time frame that we could revise or thinking about changing that is already in the SMS rule. Essentially we have a 10 year recovery time frame but it has some caveats if you go beyond that. There's some really squishy language about how you go about that. But really what we are talking about is a scenario like this where you have these concentrations coming in. Let's say you can from a technical standpoint remediate by capping and dredging down to your cleanup standard which is 4. You've got a final cleanup except right afterwards – or 3 months or 6 months you are recontaminated above your final cleanup standard. What do we do? The idea of partial settlements came up. The idea of sediment recovery zones came up as well, in terms of site definition here. Let's say that these little circles that are a nice clean site, but because our natural background concentrations are 4, our regional background concentrations are 10, and area background is 20. It's going to be really difficult at these sites to say these PLPs are 100% responsible for these background concentrations – that we're going to hold them liable for all that. Once you start you getting out of the areas where the concentrations sharply drop off, it's more and more difficult for us to say, yeah you are on the hook 100% liable. There's a mixed plume- they are likely partially liable. It gets really squishy about having certainty about how liable they are. These are some really huge questions and issues that we are dealing with no matter what the cleanup standards are. Site definition is a big one, how do you decide where this site starts and ends. Let's say you have a contour where it drops off from 150 to 40 and then it drops off to area background and then it keeps dropping off to regional or natural background. At what point do we call this site defined.

Glen: Question/ observation. Seems to me at some scale Ecology may want to treat a region as a site and have multiple PRPs. There would be the scenario – then you wouldn't be fighting so much about defining a site boundary within a site, except from an allocation perspective. Versus – let's say you have these plumes – but you have people that want to move ahead of Ecology's schedule of cleaning up. Is that what you are really talking about.

Chance: We can consider all sorts of scenarios. We can talk about that. So let's say we have an embayment a site – let's just call that. The entire embayment is a site and these individual folks with higher concentrations are units within a site. And they might be willing to move forward if they can have resolution of their liability.

Teresa: I guess I'm having trouble with the whole premise. You wouldn't give them final settlement - site recovery zone is part of the cleanup site. There is a clean water side of the regs. If the recontamination is from point sources, or aerial deposition - Why couldn't any PRP clean up their mess and get a complete sign off for that, and then transfer whatever recontamination occurs to the water quality side of this. I'm thinking of Thea Foss as an example - the tar companies clean up their mess - whatever recontamination occurs is going to be the City of Tacoma's issue, not the tar companies' issue. Why isn't that the obvious....

Chance: I hear you. I think that could be part of the scenario. Let's say it's not the water quality program - let's say it's the NPDES program - whether that's administered by our program or the water quality program, at this point.

Teresa: Whatever you want to call it - it's not the cleanup program.

Chance: Let's include non-permitted sources - how does that play into that scenario.

Teresa: I don't think that it changes the picture, it's still the responsibility of the water quality program. It falls under the Clean Water Act, whether it's state or federal program. That's the water quality program - I don't think that should have ever been a cleanup program issue.

Chance: Let's say under that scenario, that all of these sources - we've identified them and we are going to go after them as an agency and do our best to ratchet down what they are discharging. That's a big task to physically do that - but let's say that can be done. We aren't going to make PLPs liable for that recontamination. Working with these guys hand in hand as we try to get the cleanup done.

Teresa: It doesn't have to be done at the same time. That's what I don't get about what you are trying to say. The point is we are trying to reduce hotspots. If we can get these bays from 200 along the shoreline to 40 or 20, that's a huge improvement. And it may take another 50 years to get the CSOs separated and the stormwater controlled and to reduce the aerial sources.

Chance: So are you saying we should use the sediment recovery zone tool in the SMS?

Teresa: You don't need it. Don't even put that part in the cleanup program. You don't need it. That's where all the burdens and liabilities lie.

Brad: So what kind of cleanup standard are you thinking of? I'm confused about what the cleanup standard would be.

Teresa: The cleanup should be based on what the PLP contributes. That's not a PLP source.

Brad: So does the cleanup standard look more like area background, or what does it look like?

Teresa: I don't really care about that in my comments right now because they are going to cleanup to something - the point is what happens then. They clean up to something - you give them a sign off - you say yes you cleaned up your hotspot - you cleaned up everything you contributed. Then it's off to another program....

Chance: Can I ask a question about that? So you clean up what you contributed. When you are talking about a scenario like this with dioxin. How do you know what an individual PLP has contributed to the rest of the bay that's hovering around 10.

Teresa: I would say it doesn't matter if you have ongoing sources that have recontaminated it up to a certain level, even below that level is irrelevant.

Chance: So anything below the recontamination level is irrelevant.

Teresa: Yes.

Chance: So you clean up the site to the concentration that is the potential for recontamination. Is that what I'm hearing?

Teresa: Define their liability by that. Just as a practical matter we've got to have some practical approach.

Chance: I'm just trying to clarify. So you're thinking look at what they contributed – clarify their liability, resolve their liability, anything above what is already potentially going to recontaminate.

Teresa: Anything below that is moot because you are still going to have a problem and you can work on that through other tools the agency has – with the water quality program.

Chance: any other thoughts on that idea? Clay are you there.

Clay: I'm having a hard time following.

Chance: Let me explain. We've got Elliott Bay – for example – we have 4 hotspot cleanup sites and the rest of the bay is above natural background – let's say it's 10 parts per trillion – that's regional background. Teresa's idea is settle liability with PLPs for what they contributed – base that on what the potential recontamination level is, anything below that is moot. Anything above that is – that's the concentration you will use to settle liability. That's how you define how far out you go to define what they're responsible for.

Clay: ???? (static on phone line)

Teresa: These could be adjacent sites.

Chance: We've got multiple sites, we could call the entire embayment a site because it's above the cleanup standard which is 4. And then we could call the individual sites in parentheses as units. Let's just say this for conceptual purposes. So we are looking to resolve that PLP liability – get them to clean up their hotspot – look at identifying and resolving their liability based on what is coming out of those pipes that the sediment is going to get recontaminated at.

Clay: I think that actually makes a lot of sense. There's a lot of crossover between the legal and policy issues in terms of site definition. Allocation of liability and all that.

Jack: Going to add a little twist to that. If we make the assumption that the source is controlled at the sites and hotspots are cleaned up regardless of what the background concentration is. Those 30s and 20s, from what I gather those are water concentrations. They may contribute again just to the same you levels you got there – but the PLPs that have cleanup there – they've gotten rid of their source, they've gotten rid of their hotspot – they should be done. And what happens after that is somebody else's liability – and Teresa is right they need to be addressed by water quality program to prevent more hotspots from the incoming waters.

Brad: Can you clarify something in the scenario. How do you determine the PLPs contribution when you have area background concentrations – when you have other releases coming in that are not their concentrations. How do you resolve their liability for cleaning up their "hotspot" – they are done with their site cleanup responsibility period, or they've done an interim action for which they get a settlement. Those are two very different things.

Teresa: Yeah they are different. And if you want people to actually do cleanup, I'm going to channel Paul since he's not here, you need to look at ways to give them final settlements. I think if you have other sources coming in that are going to recontaminate the bay, that is what you should be focusing on using a different program. And if you can get these guys to clean up their messes so that that activity can take place and be successful, they should be done. That's as much as you are ever going to get from them. Because cleanup is a very cost intensive process.

Glen: This partly me not understanding the authority of water quality versus the sediment authority. And I agree in terms of looking at incentives for parties to achieve final cleanup. Let's say your circled areas are cleaned up and your outside areas are between 20 and 40 – which you are just leaving in place because you have ongoing sources that will recontaminate.

Chance: Are you calling that area background.

Glen: If that makes you happy. I think by definition area background includes the localized sources, so yes. So water quality comes in and controls the point source discharges such that it's not an issue anymore. So the residual sediments are not at natural background – do they just stay? Who is responsible for cleaning them up?

Teresa: There is some monitoring that should be done to see if it will decline naturally. Parts of Puget Sound are improving. If they are going to decline naturally, then it's best to just let that happen. If they don't decline – I think there are some creative ways to enhance cleanup – like taking dredge material and slowly sifting it over areas of the shoreline – would be way more cost effective than traditional dredging or capping. But I personally believe that is so far in the future. If we could get all the hotspots in the state cleaned up – let's worry about that. Once the big stuff is dealt with.... We need to make some progress. I've been working on this stuff for 20 years and most of the sites I started on are still in the system. You know it is so frustrating to see that and I know everybody shares that view. If we could just get these big sites and big contaminants out of the system, we could worry about the last part. If we keep them on a list and keep tracking them, and in the meantime we can be monitoring to see if it is improving.

Glen: I'm not interested in creating obstacles to clean up here. What we articulated several meetings ago – let's figure out a way to make meaningful significant progress in the short term but not lose perspective over what our goals are and where we want to be in the long term. I guess I was asking about capturing in programmatic language in the rule to make sure we don't lose that second half. Not to trip over that second half.

Jack: Maybe that is discussion about revisiting the area-wide, regional background to see whether or not they are changing.

Teresa: We used to have in the rule, clusters of low concern.

Chance: Yes we do.

Joann: I'm going to point out the timing issue here. A lot of these cleanups are initiated by circumstance – sale, purchase, development or land transaction. So that might drive the first site where the other three aren't even involved, but what's jumped out. Timing is everything. It plays into the things Teresa pointed out, such as source control, natural recovery – all those good things of getting towards that end goal. You have to take a bay-wide approach. You can't work these well

otherwise. From a PLP standpoint – if I want to do one of these projects – you mean I have to study all the inputs? The burden is overwhelming.

Chance: We don't just do this site and move onto these – we've got to consider the whole bay.

Joann: You've got to consider the incentive factor – there is no real incentive to kick it off, but there are those other drivers that resolve in taking the smaller actions.

Chance: Great point. I have a follow up question for Glen. Let's try to figure how to get these hotspots cleaned up – that reduces risk immediately – but you don't want to lose sight of the long term more conservative goal, which is natural background.

Glen: Or even regional in your scenario.

Chance: So how do we get these guys to cleanup, resolve their liability, and still in the long run meet these targets over time. I think the question is...recovery time frame here. What are we talking about 10 years, 30 years, 50 years. We can model it, look at sedimentation, whether or not the sediments coming in are clean. These are important issues for us to figure out what is actually palatable for a timeframe to reach that conservative goal.

Lon: One thing we've been looking at for Lockheed west is this issue of sequencing. Something I threw out is the PRP reaching a settlement eventually for their part of the cleanup process. So that would allow the regulatory agencies to take a broader view and then bring in those resources at a point that is appropriate. And this issue of addressing hotspots first – the dredging of PCBs in the Duwamish is not a shining example of remedial action, but in that case the agencies really get a black eye because we spent a lot of money to do a cleanup and then it is going to recontaminate. And then you look at some of these more ubiquitous contaminants and I think we have to educate the public and say we are not going to take care of all of these contaminants. And for some contaminants, they are going to come back after we clean them up. So we have to reduce expectations. The agencies shouldn't be getting a black eye over this.

Chance: Could you repeat that last one?

Lon: Sure. Basically it comes down to – we can take care of the legacy contaminants like PCBs but we can't take care of cPAH etc. that are part of stormwater runoff or chemicals like phthalates that are in use. So we are criticized for blowing scarce public dollars to do a cleanup because it recontaminates. So if we are really going to go after the hotspots of the legacy chemicals – we are going to have to find some mechanism for dealing with the public criticism – wasting public dollars.

Chance: How about the concept that this should be a comprehensive agency-wide effort to take care of the sources as best we can – not just rely on cleanup.

Brad: Related to what Lon was saying – when you say resolve liability – you have to be precise about what you are talking about. There is a big difference from resolving liability for a remedial action, a removal that is an interim action – and what is a final number. I think you have to know about that piece out in the bay so you don't lose track of the long-term goal. This area background- there is contamination out there that is joint responsibility – joint and several responsibility – from lots of PLPs and that they are still on the hook...(to what point?). And that is the point – that is your cleanup standard – you need to figure out what that is but make people responsible for going back out again and again to cleanup somebody else's contamination obviously. But we also don't want

to let that responsibility fall to the public and just let PLP cleanup a hotspot and resolve liability. Then there is this area background blob that doesn't get addressed. Maybe it recovers naturally – MNR – that's great. But somebody still has to be responsible for monitoring it, that action is occurring and if it doesn't - then what happens. We still need to hold parties responsible for their releases.

Chance: So you think the PLPs need to be responsible to make sure that recovery is occurring. Clay, do you have any comments?

Clay: I've been following some of this. I think what Brad is saying that you don't want let the PLPs off the hook for monitoring. The reality of this is that at some point the agency is going to need to make a determination as to – you have to balance with what Teresa talked about – making PLPs stay on the hook for things that are beyond their control – like other source control mechanisms. I'm curious to how you would balance that. It's not going to be in their interest to sign up for something that they are not clear they can ever achieve through their own abilities. They are going to want to go to the courts. How would you take care of that in your scenario Brad?

Chance: Can I distinguish two points before I have Brad answer. Are you saying the PLP being on the hook for what's coming into the bay versus what Brad is saying PLPs being on the hook for what they contributed to the bay.

Clay: And I don't know which scenario we are on at this point.

Teresa: They are indistinguishable.

Clay: I think it's a mixture of the two. Yes, most of the time it will be the case that they are indistinguishable – or differences of opinion of whodunit. Let's say for the purpose of this conversation it's a combination of PLP releases in the far field – historical plus ongoing sources that are as yet to be controlled.

Brad: I guess I was thinking of the case of ongoing sources that is not a release that is not a PLP – the PLP should be added to the site. Or you can handle it under program, or it could be added as a separate site. There are mechanisms to handle that. Teasing out how much belongs to who is another topic entirely. But people negotiate and reach settlements on these things all the time – not without a lot of effort – but it goes on.

Clay: It would be helpful to put this in more concrete terms. Fox River – outside of state of Washington – large site with probably 40 different PLPs. The question of ongoing sources versus historical releases from a PRP – even though there were lots of investigation, nobody was able to figure out whose it was. The process didn't go anywhere. It was stuck in legal litigation/ allocation for probably decades, until EPA and state of Wisconsin said we feel comfortable enough that external sources are controlled. We will go ahead with the cleanup and we will let these PRPs off the hook if they do the cleanup. This case – there was a remediation level kind of overlay and the PRPs are on the hook to monitor the recovery over time – for the next 30 years. But the PRPs have a release – if that recovery does not occur – they aren't on the hook to do more cleanup. This project went ahead because the agency was willing to make that leap. Sites might not be this complicated – but I think we have things that are pretty close.

Chance: Okay. I'd like to throw out one more thing for discussion and then I would like to hear from the audience. But this idea of institutional controls – we are limited with what we have for sediment sites, at least with our traditional concept of institutional controls. So if you have a site where you aren't able to meet the cleanup standard as is – but if you implement institutional controls you can get a final cleanup. What does that really mean for a sediment site? The idea of fish advisories was suggested at one of the meetings but that doesn't go over well with people. Are there some ideas that people have about what type of institutional controls could work in these situations where you can't get your cleanup down to a natural or regional background.

Teresa: In all the time I've been working on sediments – I see two purposes for institutional controls – they protect caps and they protect habitat mitigation areas. They really don't have a place other than that. We are talking about natural background concentrations that aren't protective of human health. Even if we reach background concentrations we aren't going to succeed at protecting human health for some of these contaminants. So it's kind of silly to tell people not to fish – they fish anyway even right next to the signs. It has to be recognized that that type of institutional control a. does not work; b. does not meet our public trust; c. does not meet our treaty obligations with the tribes. There are institutional controls you can put in place to protect caps, no-anchor zones – things like that – but those I think are also somewhat questionable and may or may not work. But you can try. You can at least keep a cable from being put through your cap. But unless it's on privately owned tide lands that are part of an industrial site, where the site operator can really manage what happens at that site – institutional controls aren't that useful.

Clay: Even though I agree with Teresa on everything so far. I actually think institutional controls with fish advisories have a place. I think we've just set the bar at a yes or a no – is it protective – but I think at a lot of these sites its' going to be relaxation of the fish advisory – so they can eat 10 fish per month instead of 1 fish per month. In the cleanup program I think that is how we should be defining success. We opening up some huge public health policy issue that I don't think the cleanup program wants to do. But the interim period while the system is recovering I think the fish advisories can work to protect a big segment of the population. It doesn't work for everybody.

Glen: I have a comment – and this reflects a different understanding of fish advisories that are issued by the Department of Health to give consumers advice on what the risk of consuming seafood is – I think there is a role for that and a continued future role for that. The use of that tool as an institutional control at a sediment site is where I have problems. I fully expect that whatever the site is there will be fish advisories – but relying on that as an institutional control to further discourage resource use as your cleanup tool is what I have a problem with.

Chance: We are end of this discussion. Let's ask the audience for comments.

Audience comments :

Rob: I appreciated Teresa's review of the bioassay and that's going to related to how – the important to remember is that these bioassays are only so sensitive – that's why the triad approach was developed. Ultimately Ecology, especially with the chronic test, you might want to do some analysis of population level endpoints and how they relate to the test. It would be very instructive

to do that and some work has been done in that area already. In the regional background issue, it seems to me that quantitative spatial analysis – whether it's geostatistics or some other tool – let the data tell you where regional background is. Yes you might have to normalize to organic carbon, or normalize percent fines for metals – you need to let the data tell you – it will sort out is it a bay-wide approach, is it a watershed into the bay, does it extend out into the bay or is it a Puget Sound wide approach.

Roger: Two things. One on the biological testing it might be appropriate to look at the variability in your reference samples. A recent study looking at multiple samples in a reference area, different lab batches, ranged from a survival of about 40% to high of 100%. So might want to see what the range of normal variability is in those cases. Second point – on your scenarios. I don't know how you know what is coming out of the pipe. I'm not aware of any NPDES permits that monitor PCB or dioxin. (Good point) Very few NPDES permits even evaluate any chemical testing other than a few metals.

Chance: Just stretch your imagination for these examples....just for now. It's a good point.

2:48

Heather: There has been a lack of looking at adaptive management, I think Glen was trying to get at that. The issue of looking at how background changes over time needs to be somehow written in to the rule. Want to re-iterate – we need to assume that source control is going to occur. And on the issue of source control – I feel like the committee is working around source control and basically describing the status quo – instead of really coming up with some ideas to address this issue. I really like what Teresa says normally, but I really dislike with what she just said – the long comment she made about let people do their own site and not deal with the bigger issue. We need Ecology to step up and deal with this at a larger scale than the individual sites.

Chance: Are we talking simultaneous with getting the cleanup done, or in stages.

Heather: I disagree with the decades later approach. The problem is that there are no water quality people in this room. We have the siloing continuing by this process of not having the water folks in the room right now. We from the outside really see the silo problem in Ecology. And this committee and the other committee would like to see us actually come up with solutions where these things come back together. We have Urban Waters Initiative, but we all know that is not working very well. That is one approach that was put in to deal with this issue of bringing back the water and the sediment back together and put the programs back together to work on this. So I really feel frustrated to hear what is going on at this table. I feel like people are just describing the status quo and not really coming up with solutions.

Chance: For the source control issue?

Heather: Even for that scenario right there – we need start coming up with solutions and thinking outside of the box you are in. The public is not going to accept this. We are passing laws to get phthalates out of products. So it's not like these ongoing sources are going to continue, once the contaminants are identified. The whole toxics loading study for the Puget Sound Partnership, which by the way, was identified as a Puget sound wide effort - that's already been set by Ecology

to do something about Puget Sound. We've got to get out of the box here – that is my main message.

3. Statistics (Greg Glass)

Chance: I want to introduce Greg Glass who is an Ecology consultant helping us work through some of the statistics issues.

Greg: Couple of brief comments – the scope of the discussion is really wide ranging trying to set up everything you need to run a sediments program – so there were lots of things I heard that were interesting to me. Couple brief comments – the whole issue about background seems to me is to get the right or complete enough conceptual model into place to answer the question – does a data set represent that which I want it to represent – the question of representativeness is all important for background. Statistics is not going to save us from poor datasets – either because they are weak – not enough data – or they don't represent that which we were hoping to represent. There is abundant evidence of urban to rural gradients both in atmospheric deposition and in sediments from people like Totten and Hornbuckle, and especially Miriam Diamond out of Toronto – done incredible amount of work on PCB gradients. You can throw in cPAH probably lead and a few metals, dioxins and furans. It's not one peculiar chemical that has this characteristic. When we start with the assumption that we want to define some type of background once regionally – 2 things can happen – if you allow off-ramps – you may run into the problem of the resource necessary to do a site specific characterization will be beyond the pale for most situations. Somebody else has to go out and do the BOLD dataset but do it in one embayment or one small area – that's a lot of money. Now a megasite might handle that, but very few sites are megasites. On the other hand, if you don't allow an off-ramp – you may end up with a mis-characterization. That one dataset may not fit for other sites for chemicals where there is an urban to rural gradient that you are either unaware of or unwilling to deal with. Background may not be the same distribution in different locales. So that can create errors of two types – being too strict and never get there or being not so strict and essentially allowing an increment. We talked a little bit about increments, as you folks did, I see mis-classifications of not knowing the difference between something that is impacted by a source you want to characterize versus what is some amorphous, undetectable generalized background level – just leads to an increment. The problem there is that it is very hard to distinguish – as Clay said – very hard to distinguish some minor low level impact from historic sources from ongoing atmospheric deposition storm drain kinds of stuff. They are both the same sort of levels – forensically you just can't distinguish them well. If you put those things that are source related into a background dataset because you can't tell them apart, what you may do is pull out the right tail of background. And the impact that has everything to do with what you do with the numbers. Lot of folks have defaulted to the 90th UTL on the 90th percentile – an upper upper tail value. You throw in pulling the upper tail up – you could move that number a whole lot. That may or may not be in your interest but the point I'm trying to make is all you are really doing is allowing an increment. Increment may fit in a lot of ways. You may say you want to cleanup to background plus an increment. That was an idea that was almost touched on this

morning. Statistically you can do that – there are obvious ways to do that. That's probably all for more.

Chance: Greg, could you have a seat up at the table there. You have the handout that has the statistical questions on it. The goal is – we put this document together – and want to hear about your experience on cleanup sites and curious whether or not this set of questions is what we should be trying to answer from a statistical standpoint. I'm hoping you've had time to read this – these are the questions we want to answer. They are divided up into three different areas – the first is defining your constituents of concern or your COCs that may need to be further investigated, then determining your cleanup standards, then determining compliance at your site. There are divided into those three groups and the questions listed for the COC question – how do you determine whether or not you need to further investigate a chemical at a site. How do you determine site boundaries that are distinct from background concentrations. For the cleanup standards, whether it's based on natural background, or regional background, if that is what we end up doing. And then for compliance at a site – how do we determine if it is based on risk-based cleanup levels, and then the same question for background. So these are the questions we've identified that we think we need to continue to answer. I wonder if anyone has thought about other ones. Then we can go into 2, 3, and 4. Your decision how we do that. For 2 we are talking about a tiered approach for small, medium, and large sites. Perhaps look at different types of tools that might apply to those sites – there is not a one size fits all kind of site. And then there is the question of comparing populations. I understand reality that we aren't going to get through all these – the most important thing is to see whether or not we've defined the questions appropriately and then move onto questions 2, 3, and 4. Does that work for you Greg?

Greg: Two quick statements. As the scenarios were being developed I found it fascinating that no one commented on that numbers are being used to characterize background. Background is a set of numbers – it is a distribution – or several distributions – it is not a number. There is an implicit rush to do that partly because there is a precedent for doing that and partly because we are comparing background to other things. The easiest thing to do is to ask is this thing bigger or smaller than some other number. There's a lot in that, and we may need to come back to that. When you talk about the statistics – think of the toolbox and metaphor that we've often used. There are tons of statistical tools. Way before we get to selecting tools and trying to decide which one – or the mechanics or guidance of how to crunch numbers – it is vastly important to get well defined questions for the statistician to answer. And I'm sure it's obvious to everyone here – but does that site exceed background is not a well defined statistical question. It's an ethereal – don't know quite what that means kind of question. Finally, there are lots of statistics in other programs, such as the DMMP program and Teresa worked on the statistical workshop. We certainly have a lot to do with statistics – we can go broader and look at WET testing – there are lots of models for statistics. Either from your own experience or models for statistics – whether from those things models of good performance or poor performance of statistics – to keep that in mind as we gather information. We don't necessarily have to invent something brand new here.

Jack: One statement here – of the questions – these are all chemical based sediment approach – there is no biological availability, no biological evaluation in here. Is that what we are really targeting.

Chance: At this point, yes. I think the questions might be different for that.

Jack: It's bioavailability – bioaccumulation. Biological responses – organisms how they respond to the chemical that are there – there are all sorts of things that you can't get out of just chemistry.

Chance: yes

Greg: Statistics can be applied to modeling uncertainty and many other things – but I guess the narrow band here is to deal with chemical concentrations and statistics.

Clay: The way this thing was laid out was very good and framed very well. I would be interested in jumping into some of the details. I know Lon has been patient about wanting to discuss the spatial aspects of this. But I have no issues with how the questions are laid out here – I think that it is framed well.

Teresa: Starting with the questions. A question that is even more basic than any of these – what does the data we work with look like. What does sediment data look like and what types of statistical methods are most appropriate for it. When we started working on dioxin and DMMP – we ran into issues like how do we deal with non-detects – or how do we add things together that had different percentages of non-detects, and wildly different detection limits. And that kind of informed our decision to move to non-parametric statistics without substitution. And so I think with all of the experts we work with and the sites – they ask what kinds of statistics are we using and then we can answer your question in a more specific way – using parametric or non-parametric using substitution or not. At least it narrows down the tools you might want to use to ask some of these questions. So I would encourage folks to look at what we did there – maybe not reinvent the wheel on this and see if everyone agrees with the approach. Are there issues with implementation? Is it going to be hard for the public to understand and use, is there enough free software out there to use – that we feel are adequately tested. That's a more basic question we needed to answer – what is the nature of our sediment data and what types of statistics will lend themselves most easily to that. Then on objective b – I felt we were smushing two different things together there. A totally separate question is – what is regional background. Characterize regional background. Characterize natural background. Regardless of whether you are using it as a cleanup standard, a source control standard, or a long term goal for Puget Sound. What does it look like? But also what are some point values that help characterize the data set. To me that is a separate question from what is my cleanup standard. Your cleanup standard may be one of those backgrounds, or some point in one of those background distributions, but it's a separate question. Your cleanup standard in one context may be a different point on the distribution of background than at another site or in a source control program, or for the long term goal for Puget Sound. First characterize your background, then decide how you are going to use it. Those are my comments on the questions. I have comments on the later part but other people might have more comments on the questions.

Chance: Does anyone have any more comments on the questions. Audience?

Lon: One thing you might want to look at is performance. If you are looking different compliance tests and you have case studies, can you determine false positives and false negatives and some of the economic implications for proposing cleanup standards in one format or another based on background.

Chance: Greg, Brad – do you have a preference on how we go through the rest of this? 2, 3, 4 ?

Greg: Sure. The second point – tiered test has two concepts. One the idea of tandem tests – at any one site, you apply more than one test. We use this illustration when we were talking internally a week or two ago. This idea of using an upper tail value like the 90th on the 90th percentile or something like that – really works best or was developed first – to consider a data point and ask – are we sure or reasonably sure that it is not from the background distribution. It's so high up in the tail it's uncommon in background, that's not to say that's it not background. Consider now that you take 10 or 20 points and apply that same test to all of them. It's conceivable that all of them pass the test – but if you looked at the means or medians, you would find out that that distribution – that packet of 10 or 20 is distinctly different from background. In a tandem tests – you could have two tests – and then you could say if any one of them fails, you fail. This has been worked into MTCA as you are familiar with. And the other idea is allowable increments or allowable exceedances. In comparison to background, does every test have to pass, and does it have to pass at every scale? As you raised Clay, we've thought a lot about spatial scale issues. The other kind of tiering is looking at a site and deciding you want one type of approach or another. Normal tiering based on site complexity or implementation problems – or kind of what is worth fussing over or not. For example, you might take a conservative approach for small sites and just get done with them and not have to mess with statistics. Essentially all points have to be down in the lower parts of background. But in complex sites – the mega sites, someone might be quite willing to spend a million or two to get good data, hire statisticians – and the problem you were talking about becomes a large loop. We could benefit from tiering all the statistics within the programs, so that tiers were available for quicker passes, whether that is an advantage or not for individual PLPs I don't know. So give me some feedback on those two types – idea of tandem tests, and the idea of different approaches for different scales of sites.

Chance: And we mean by scale is small, medium or large sites – the way it is listed out here. We are talking large megasites like lower Duwamish. Medium sites – I'm not sure how that would be defined.

Greg: To be crude about it – you have your \$10 million sites, \$700,000 sites and your \$50,000 sites.

Teresa: Is there a \$50,000 site? (That's pretty small in sediments) Yeah – that's one dredge load.

Teresa: I have a couple thoughts. I think 2 and 3 are tied together. Let's go to your first example of tiering – tandem tests. I was just the facilitator for this workshop, so this was not my opinion, but it was unanimous among our panel members – they had a very interesting response to that – because all of our programs do tandem testing. Like you pointed out MTCA and our other programs – it makes us more comfortable as regulators. But what they said is if you are doing tandem testing you aren't designing your test right. It's not answering the question you are trying to answer. You should be able to have a statistical test that answered your question correctly.

Greg: Couldn't you be asking different questions that are all meaningful and different – not just trying to ask the same question 3 different ways.

Teresa: I think they were reacting to having 2 tests to a question – then you weren't answering your question with the proper statistics. But if you are asking two different questions – of course. So that is one thing. Rather than small medium large, which is hard to define – what these experts and what our workgroup came up with is really liked in the DMMP program and see how it fits for you. You could have a natural background – look at the natural background distribution. Like the BOLD data has 70 data points - make this data set available to the public, and you've also calculated a point value that you feel as an agency you are willing to use for comparison to natural background. So you have two things – a point value and a distribution. And you say to the public two things – if you are a small site, or you have less than say 10 data points – below which you can't have a meaningful distribution – use this point value. Anyone who wants to - small, medium, large– you can use this point value for comparison. Or here is the population distribution – and you can use that to compare your site distribution to the natural background distribution. We give every site those two options – and then it is their choice and both are acceptable to the agency.

Greg: In the latter case, you don't have a number called background, right?

Teresa: Right. You have a distribution.

Greg: Have people thought through that and are okay.

Teresa: And you have a statistical test that you are using so it's well defined.

Greg: But there has been a historic push that we just want a number.

Teresa: That's why we give them a number too. So if they just want a number – there it is. But if they are going to hire you to do the statistics they can do that.

Greg: In the example we gave earlier – the same data might pass the first test and fail the second.

Teresa: It could. That's why you have to choose your point value carefully. It's just like you have the biological overrides – you might fail chemistry but pass bioassays – you might not get the same answer. But we could decide which answer is "better" if we want. Or we could say whichever people want to do – they can do that.

Greg: It's interesting to me this concept of division – if you pick one of those upper tail values – you could have passed all of the points and essentially filled in an increment above the true background distribution. As long as you know you are doing that, and you are doing that willingly – it's sort of a new concept of what background means. Meaning it is plus an increment. One way would be to say it is background plus 1×10^{-6} increment, which doesn't always work because it might be too small. The idea of an increment is sort of built in– the idea of tests of the means can be transformed in exactly the same way – defining the increment and adding it in. Doing the test that way.

Teresa: Or some non-parametric method of doing that.

Greg: The point is that you can allow for increments in either test essentially and therefore it's a policy question – do increments over background make sense as a target.

Pete: Greg you inserted the term increment. Could you tell me more about that. IS there something behind that – could you use another word? What do you mean by that term.

Greg: I'm using it in the very generic sense of a magnitude above the point you are trying to test against. Say does the distribution of my site data exceed the background where I'm testing mean versus mean or median versus median. Well I could test my background mean plus delta. What delta is, is an open issue – it could be a risk based number, could be a magnitude defined in any way you like – but the test would be set up – so tell me what the magnitude of the number is. I think I heard somebody – Jack – does background itself constitute an increment? If you say that – then it is a test of the mean plus the mean – wherever that comes out in the distribution.

Jack: I have an observation. I think that we all believe that these numbers we are talking about are absolutely accurate. (no) If you look at a CLP program as an example – spike recovery for metals within a range of 3 fold are acceptable. Spike recovery for organics within a range of 5 fold is acceptable. We think 10 and 20% differences are good over here. I don't believe that at all. Depending on who did the test, when they did the test, how they actually made the measurements – all of that is in our noise that we don't actually address.

Greg: That could be a way to get to increments too. There's an idea of composite sampling – called multi-increment sampling. It's much harder in sediments because it's hard to move the barge and drop 30 drops. But if somebody wants to do it – you can get one MIS number – and someone will tell you I know the mean...but if you did it a third time and a fifth time, you get different numbers because there is variability. That can be because of sampling variability or error, which can be because of the lab variability or error, it could be analytical error or lots of different things. The point is the measurement is uncertain – and you might want to use characterizations of uncertainty in your decision making – in some manner.

Jack: I was getting at – those are really large in test validation or validation chemistry. You have a 3-fold difference in metals, or a 5-fold difference in organics. We really think we know something when it's in the 50% range in chemistry – and I don't think we do. So somehow when we do statistical calculations – we need to factor in how noisy the data is. Which really means going back to the QA evaluation of the data – not just the numbers in the datasets. Not just the numbers that we were reported and we think are real.

Greg: So to put in different terms. So if I thought I had background characterized for dioxin as 4 in the BOLD dataset, but if I split the samples and had sent them to a different lab or the same lab – the 4 might move. My impression is that despite what you've said, 4 may move, but it may not move to 10, and it may not move to 1. But it will move in some kind of range – but it requires some characterization to determine what that range may be. We don't usually have those data – the conceptual thing I said isn't done – we don't repeat the whole experiment. The most we have is lab QA data as a means of measurement.

Jack: That's where a lot of that information is.

Greg: Subsampling is also a problem. When you get a barge volume and you are reducing it to a small aliquot of what will go through the instrument. EPA Las Vegas has some recent guidance on this – but the point is it's an additional source of uncertainty – especially when you are talking parts per trillion, parts per billion. The general concept is data quality, what kinds of data do we have and how do we want to use it. The concept is if you understood or appreciate uncertainty in some of

the measurements – does that create ways where you would be a little less strict or a little more creative about how one does the statistical test.

Jack: I think that would be a really appropriate thing to do so we could get an idea what this range of noise is. It's really built into the analytical measurement itself.

Teresa: Can we go back to the delta issue again. We looked at the delta issue in DMMP and it was rejected from a regulatory perspective. We had the attorneys general look into it and found that it wasn't consistent with the guiding documents. But it could be that the DMMP stuff that wouldn't apply to this process. I'd like to ask -Could it be that using the upper percentile necessarily included the delta? I thought, I could be wrong, but let's say you picked the 95th percentile for a comparison value, and if you are below that you are good. Let's say there are only 10 data points. You wouldn't expect to have any of those values fall above it, even if it had the same distribution. Or you could word it differently – and say 1 in 20 values can exceed the 95th percentile. That's what the 95th percentile is. Does that necessarily include a delta – or are you saying for some datasets there could be a delta that is hidden because you are doing a point value comparison.

Greg: The actual statistics that you would set up would be a binomial probability, which is classically do this with all percentile based tests. So the smaller the number of samples the more likely you are to have a shifted site distribution but not be able to detect it. So if you like – that's an error – but if your policy is – that's not an error as long as your shift is not bigger than delta – you are fine. So that's how you set that problem up. It is not a given that in every case you will find an error. If your shift is enough and you take 8 or 10 samples – 3 of them might be over – and that would be a very rare event if it wasn't shifted. So the statistics, error rates, the power curve all come straight out of binomial calculations that are easy to do. This is not real exotic terrain for statistics. But the hard thinking part is what do you think about increments and deltas, what is the policy call? If that is clearly stated, this is the business of a well-defined statistical problem – we can go do statistics and create tables and come up with decision logic. If you take x number of samples and you get this result – you fail or you pass – it could be that easy.

Teresa: So you could say as an agency – for the purpose of allowing small sites to do comparisons for convenience – we are willing to accept a potential shift of up to X – because it is a small site and the potential implications of allowing a simple path through this process are important. Is that kind of what you are saying?

Greg: It may not just be small sites. There's a ton of important policy, risk communication, public information, public willingness and PLP willingness – is all buried in here. It's that whole section that Chance introduced – it's all in there.

Teresa: I was thinking that the bigger the site – the more data you would have to detect a shift.

Greg: The reason Pete Kmet and Dave Bradley, when they started doing statistics in MTCA, came up with simple minded things called frequency and magnitude into consideration. The approach – I don't mind if every single point is below because we're protecting human health and no one eats dirt from the same piece of dirt for 30 years. If you are benthos in a tiny little area – we've got that to consider on the side. If you are a wide ranging fish, one point isn't worth all that much. If one

point isn't worth all that much – what is your tolerance for an exceedance? So it is either a shift in the distribution or the hotspot is in the tail. And by the way in the tandem test – you can do a test to see if any hotspots remain in your site. This is fairly classic terrain – Hanford worked a lot of this out for a background based statistic years ago. There is a hard thought problem here – what do you think about increments – what is the tolerance for small magnitude, small frequency exceedances. Is it worth trying to be pristine and precise to say you absolutely have to meet background. Which may be impossible. If random fluctuations are going to fail you with some frequency anyway at these low levels. The lower background becomes the more important the analytical problems become, comparatively. But if you have the idea you want to allow some increment. You have to define the structure of that and then go define the toolbox and the statistics. But there are some tools available that are pretty simple that you can invoke if you want to go there. And by the way – if you set up natural background using the BOLD data for sediment cleanup levels – but you get to remediation levels, removal levels that are way higher – I'm not sure you are ever going to have to do much statistics to compare your site to background anyway. The assumption is you are going to fail all the time.

Clay: I understand that the BOLD data is the top 2 cm instead of the top 10 cm. It seems like an apples and oranges that the BOLD data would be used to define natural background for sediment.

Greg: I can be a purist here and say that I'm the statistics guy and I'm assuming that you are giving me a representative data set, but you know me well enough Clay to know I'm interested in that. Just when you think you are data rich – that's when somebody points out "oh but those aren't the kind of data I want". That's my experience from 30 years of working on this. Background is hard – it's under characterized almost always – the BOLD is a pretty dang big data set – uncharacteristic from what we usually have – but I'm not telling you that it is perfect for all applications. Maybe characteristics of the sampling or analyses were done that don't fit.

Teresa: Well the purpose was to get current background. We didn't want to get historic background.

Jack: The upper 2 cm has historically been the biogenic zone – they're sandier or silty – you'll get over 90% of the species or of the individuals out of the top 2 cm. That's where that came from.

Clay: I think that we are holding up the BOLD standard as the gold standard – but a number of us were surprised. It's going to have some warts as well.

Greg: Which direction do you think it goes? Do you think it is an over estimate of background or an underestimate of background?

Clay: that's a good question. I think it could go both ways.

Greg: Things getting better or things getting worse. Aren't there some that have comparisons of 2 to 10 cm?

Chance: Puget Sound assessment monitoring program - PSAMP.

Lon: For increments, you were thinking increments then. You've got human health risks, you've got background to background, as your site distribution approaches your background distribution it becomes more and more difficult to determine the correct statistical determination whether or not it's greater or less than. So you would say what sediment concentrations would result in an additional 10^{-4} risk and then add that to your site. Your comparison would be to your background

plus and increment – say 1×10^{-4} , so essentially it would improve your ability to make a decision with this added increment.

Greg: The concept is right. I talked to Bradley and he talked to Kmet and there is a great murkiness in the MTCA rule in exactly what they meant to do or have written to do or have allowed people to do with adding increments or said another way subtracting background from their site data first. It's real unclear. They may want to clear that up. Second I'm not saying that you ought to do increments – I'm just saying if you haven't thought about it – recognize some of these other difficulties are – increments are kind of a topic that comes into the discussion.

Lon: It might be interesting to see what a human health risk would buy you in terms of a sediment concentration shift.

Greg: But would it be 10^{-4} or 10^{-6} would be the most important part of that obviously. Cumulative risk of 10^{-5} and all that it might be hard to go to a 10^{-4} increment. That's all up to you – whether you can defend it.

Chance: We've got some housekeeping things to take care of for 10 minutes. I just wanted to make sure we are covering the questions and what you would like to discuss now – I know we could spend a lot of time on this.

Greg: I'm in the early stages of working on this, so hopefully as this goes forward you'll get more concrete or definitive examples. I would solicit from the entire group – case studies or examples, both good and poor, of how statistics have been used in sediment sites in the past. I would like to capture some of that.

Clay: I've got a few – what is the best way to communicate that.

Chance: How about running it through Donna and Greg and we will make sure that all those conversations are captured for the public record.

Clay: For the next meeting – questions 3 and 4 – background concentrations point or populations, and questions of scale – is the thought to have a more detailed discussion on that in the next meeting?

Chance: We haven't gotten beyond today's meeting, but that's a possibility if people think we need to do that.

Clay: I just think those are huge issues. I think there is a fair amount of flexibility in the rule if we want to use it.

Lon: I was really liking your introductory ideas of case studies and it might be useful to pick an urban bay - Port Angeles, Spokane River, Lake Washington, and not only think through the policy on some of this stuff, but actually see what data are available and see how these various choices in background play out with specific data in case studies.

Chance: Something similar to what we did with Elliott Bay and Lower Duwamish, but with more specific questions.

Lon: Yes

Brad: In putting this together and explaining it, it may or may not, depending on the questions you are asking – it might be useful to approach from the framework of a scale. Is natural background at a bay-wide scale, region, or the whole state, global however you want to define it – it might be useful to start there and then move towards the areas of more uncertainty and less well behaved data

sets if you will as you get to narrower scopes. It may be a useful way to think of it during discussion.

Russ: Along those lines, something we need to deal with within the agency is where the policy is that we want to deal with. I think there is so much policy that needs to be decided before we look at how to apply statistics – that we have to make those decisions first.

Audience comments:

Heather: This idea that Teresa presented that you use one number or you hire a statistician and do your own analysis. Is it possible – like Jack has been saying – is it possible to define the minimum number of data points needed – size of site and complexity. The challenge we have – and this is where looking at case studies would be good – but that often there isn't enough data – and then we jump to using these tools without actually having statistically enough valid samples.

Greg: That's part of me having a very well defined question.

Heather: So how do you define it? How do you define it in rule and guidance.

Greg: That's part of the problem of having a one size fits all, unless you decide to tier it.

Teresa: At least in the work group they were willing to define a sample size that was a minimum for a population to population type of comparison.

Heather: For what size site though?

Teresa: Doesn't matter.

Heather: I think it would matter – should consider the complexity of the site.

Teresa: Well, it depends on what you are doing. If you are talking about a regional background. The site manager is going to decide whether those 10 samples are representative of the site or not.

Heather: Do you take it up gradient, down gradient – there are all sorts of problems we've been having with that.

Teresa: From a purely a statistical standpoint you can decide how many data points you need. But what it gets back to is whether those samples are representative.

Heather: That's what I'm getting at.

Greg: It's really not a function of a size of the site. It's a function of the question you are asking, the statistics and the distributions you are looking at.

Heather: So do you feel comfortable that you could frame that up?

Greg: Implementability could be a problem. I could frame it up and say that you need to collect 60 samples. That may be difficult to implement for a small tier site. That's the whole idea behind tiering – you need another way out of the box. I'm going to beat a point to death here just because it is so important to me to try to help frame this. The standard quote you often hear at conferences – if you want 4 opinions, ask 2 statisticians. The other version of that – I think Mark Twain said this – statisticians have cast much darkness on the subject, and if they continue we will soon know nothing at all. The way out of that darkness is to be crystal clear and well defined about what you are asking the statistics to do. Yes the characteristics of the datasets and the statistical tools are all important, but it's my firm belief that you got to get that really crisply defined questions first so that you know how to approach it statistically.

Chance: Okay, I think we need to stop with the statistics questions.

Roger: I would like to emphasize something that Jack said – people get a number from the lab and believe it – and even if data validation is done because that is something relatively easy to measure against criteria– real variability is not something you can get a number on at least not without a lot of money. And typical data validation – and no one that I'm aware of, unless you are a mega site – comes up with total composite variability in your analysis. If anybody has ever had the experience of analyzing multiple aliquots out of the same homogenized sample, typically you will get numbers that vary by orders of magnitude. That's one of the reasons I try to avoid duplicate samples at all costs – because then you are saddled with having to explain it. And to put it in perspective – parts per million is like one drop of alcohol in 40,000 six packs of beer.

Chance: Some logistics issues and reality checks. We had promised that we would try the best we could to limit the amount of work and the number of meetings we have. In April we will have our 6th meeting, which is what everyone agreed to, or it could be May if we skip April. And we are dealing with the fact that we are still not done, we still need help, but I realize that everybody is very busy and it was a big commitment already. The question is, and you can think about it, is anybody willing to have a few more meetings – April, May, June, July at the most. Or we skip a month and extend the time but not the number of meetings to get through some of these issues. We want to have a good discussion on the freshwater standards. Think that from a technical standpoint and in terms of the expertise in this room. That could easily take half of a meeting or an entire meeting. And we still have this human health background thing – I think we made some progress today. And I heard what you said in January – I'm not quite sure what direction we're going. That's the case – the goal is to meet with you, brainstorm, and use the information that we got from you and either refine the questions to answer or some approach that might work. We are still at the deliberation stage – and it may seem squishy and kind of gray because it is. And that doesn't mean that the input from you hasn't been extremely helpful. You haven't seen the behind the scenes deliberations that we've been doing – and the progress that I think we are making. What we would like to do is come to some decisions and develop some rule language to discuss with you. But the reality is that we aren't going to have that rule language by April – just not going to happen. We are still working through that timing and what that might look like to have some really rough rough draft language on some of these topics – sooner rather than later and then we move forward – maybe over a matter of months and then do some more rule language. We have six issues that we are addressing, human health – how do we better define how you protect human health in the SMS rule, how do you consider background, the freshwater criteria, bioaccumulation in terms of risk to critters, the general integration issue between SMS and MTCA – which is very tied to human health and background questions, other deleterious substance issue – that big phrase in the SMS that is supposed to be covering a lot of those substances out there that aren't captured in the chemical criteria – but can be captured with the biological criteria. We haven't addressed all those issues in this group. We may make a decision as an agency that we don't address all of them with this group. I'd like to hear some feedback on that. We could just prioritize the most important issues and continue to bring them to this group. If we continue that verbally and in person. So I'm not going to pin anybody down, because I know you need to think about it. But I think this has been

extremely valuable and I would like to know if you would have some more meetings with us to work through these issues. That's all I wanted to talk about in terms of logistics. We haven't worked out the timing yet – still doing a reality check with ourselves internally.

Pete: What is going on with the other group.

Chance: they are going to be meeting on the 22nd. We've been updating them on the feedback we've gotten from this group – I usually provide them with an hour or so update and then I bring that back to you guys. On the 22nd they are going to be working on fish consumption...

Martha: Not fish consumption – they are going to be looking at early life exposure, Method A values and the effects of Method A values on toxicity, risk issues. Can I just add, I was hoping this wouldn't come up, but since it has, we as an agency are taking a look at this effort – we have a lot of issues, we've gotten a lot of feedback, looking at the timeframe we want to do this rule revision and having to do a really hard reality check – how exactly can we do it, what are our priorities. Chance is asking that right now. It's very hard to say right now that anything is not important – it is all important to us. But if we look at what want to do in the timeframe we want to do it – how does that line up, conversations we need to have over the short term. We were hoping to say that by April we got the feedback we needed and can get what we think we want to update the rule – but I think what we realize now is that we need to have more discussion.

Chance: To finish answering your question Pete – the MTCA group is dealing with a lot of MTCA issues and the higher level policy type of sediment issues that we are bringing to them from this group. They are going to meet in March and then will be bringing this topic to them in April. I think they had 8 meetings?

Martha: I think they had one more than this group.

Laura: Last month's meeting was canceled – so they went out one further. That's why we didn't get an update of what they talked about.

Chance: We've been on a parallel track with the two groups. We were hoping that the last meeting could be a joint meeting. But if we are talking April as the last meeting here then we need to make some decisions. I need to get some feedback from you guys on what are the highest priority issues. If we really need to work through all the issues, then do we need to do it in person, or email or on the phone – as long as we can capture all the information for the public record. If there is some other creative way so we can get through some of these other issues. We haven't talked about the other deleterious substance issue, that's been on the back burner internally. We still need some more discussion on the human health and background issue, and we really need to get through the freshwater criteria. And then we would like to show you some really rough draft language. We were really hoping to have some rough language to float by both groups and have some informal outreach with the public in the summer, then maybe ready for some formal comment period in the fall. But that would mean we would really need to get our act together in the next few months, and we may need more time. We would like to lay it out on the table, and have some more discussions. But even if we end in April, it does not mean that this has not been a useful discussion, but we would like to have more of your time.

Martha: We had all along been saying, as we get input from these groups, is our timeframe for the CR102 for proposing the rule updates realistic. We are coming up on April now and saying that we need to make some adjustments to our timeframe.

Chance: it could be that an option is that we don't bring draft language to you, but we just have more discussions and get more information and make our own decisions, and then that is part of the public outreach that happens this summer – that's an option too. We don't spend meeting time on that. Do you have some really strong opinions on that. You could either tell me that today or we can have some email discussions.

Glen: I'm amenable to a couple more meetings – it's really valuable to me is that endpoint where we start to see where Ecology is incorporating some of these ideas into draft language. I would rather have a couple more meetings and actually understand what the plot of the book is.

Chance: Yes, from our standpoint, that would be valuable too.

Teresa: I would like to come to a few more and get to that synthesis, but one way to do that is maybe – I think we have talked enough among ourselves about human health, and background, maybe we could as individuals offer some, and cc everyone, offer some alternatives and synthesis thoughts of our own. Allow Ecology to go away and think about those for a couple months, and in the meantime we could be talking about statistics and freshwater in April and May. And hopefully Ecology could come back to us with some draft rule language on the big human health stuff, and we could dive into that. I think that a number of us have a number of synthesis ideas – it's hard to get them all out in these meetings. I do think Ecology needs a little more time on that topic, but we certainly have a lot of stuff to work through in the meantime – statistics, the spatial issues, the freshwater guidelines will be ready for discussion in May. I think we need to touch on Ecological bioaccumulative guidance as well. ODS is a quick fix. All we really need to do is resolve the question of whether it is a MTCA hazardous waste. That is the question that has been dogging us all these years. All you have to do is say whether it is or isn't. That will solve that consistency problem – I know which one I would rather have it be – but it's not my call. Unless there is something we need to talk about in this committee – that is just a clarification issue.

Chance: For clarification, Teresa is talking about other deleterious substance issue – which we affectionately call otterbuds. That's the initials of the phrase – and it's funny.

Jack: When we started this, a number of us realized it was going to take more than 6 meetings.

Chance: We really were hoping that we were going to be able to do it in 6 meetings. Pie in the sky.

Anybody else want to comment.

Clay: I'll go as long as Jack goes.

Chance: Why don't we have individual conversations with you as well.

Glen: I have an April 20th meeting on my calendar.

Chance: Yes, that is still scheduled.

Chance: I'll give you some time to think about this and will discuss with you individually. What we are asking right now is at least 2 more meetings. Could be May and June, maybe into July. That's the minimum we need to start getting into rule language on that issue. That's maybe a rather sunny outlook – but we need to be positive on these things. I'll be giving you a call – no pressure. And

Teresa, to respond to your comment – that would be great for any of you to put together your comments on these issues and send it to all of us. That would be part of the public record. That might be an efficient way to get through this. That would be shared with everybody rather than waiting for another month to go through it. I would just ask that if you have any email conversations with Ecology staff – you make sure to cc me at some point and keep me part of that process. I need to keep track of all these conversations and make them part of the public record. So feel free to have your conversations as you need to, but we need to make sure that they are captured. If you have discussions among yourselves we need to have the salient points captured so it is part of the public record. Thank you all very much for your time today.